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The Relationship between Achievement, Intelligence, Personality, and Sociometric Test Scores and the Number and Types of Questions Asked by Students of a Fifth-Sixth-Grade Class

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THE RELATIONSHIP BETWEEN ACHIEVEMENT, INTELLIGENCE, PERSONALITY, AND SOCIOMETRIC TEST SCORES AND THE NUMBER AND TYPES OF QUESTIONS ASKED BY STUDENTS OF A FIFTH-SIXTH-GRADE CLASS

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TABLE OF CONTENTS

CHAPTER PAGE

LIST OF TABLES

TABLE PAGE

CHAPTER I

IMPORTANCE OF THE PROBLEM

Within the last five years researchers, teachers, and others involved in the educative process have revitalized a classroom problem recognized early in the 1900's by Romiett Stevens during studies in New York City (17). Since then several research studies in the area of oral questioning by teachers and students have been conducted. The problem, clearly identified, remains unresolved. What then of the questions students seek to ask? Until recently student questions were set aside while the teacher's questions were evaluated. The majority of the researches revealed that teachers talked in disproportionately large amounts, but few steps to curb the domination have seemingly been taken. Studies by Floyd (10) and Suchman (21), the latter a man who developed a series of lessons for use by the classroom teacher and clarified the rationale for stimulating children to ask questions, rekindled an interest in the area of asking questions.

A. Statement of the Problem

The interest and concern aroused by the above mentioned individuals made the present study appropriate and imminent. It was the purpose of this study to system-

atically gather data based on actual classroom episodes, which would verify or deny previous findings. More specifically, the purpose was to evaluate questions asked by a fifth-sixth-grade class through a pre-determined classification, to show the relationship between questioning and the following measures: achievement, intelligence, personality, and sociometric measures, and to determine if age or sex is a relative factor in question asking.

B. Importance of the Study

Question asking has frequently been stressed as an important educative process -- so important, in fact, that any gathering of research related to the area seems desirable. If teachers can thereby be encouraged to allow and encourage their students to ask (and answer) questions, then classroom instructional procedures would likely be affected in a positive way. It is the intent of the present study to measure and evaluate several factors as related to questioning by the students. It was the purpose of this chapter to identify the problem and to present the rationale for the present study.

C. Further Organization of this Paper

In Chapter II some of the more pertinent literature and research written about oral questioning will be reviewed. Included will be a philosophy of inquiry,

a statement of the relevance of inquiry in the classroom, a description of the developmental stages for inquiry in the curriculum, a listing of inquiry skills, guidelines of teaching procedures for using inquiry, and a definition of terms. In Chapter III the procedures for gathering data will be outlined in detail. Chapter IV includes the findings based on data gathered, the conclusions, the implications, and the recommendations, and concludes with a summary of the study. Listed separately are the bibliography and an appendix of various original data and pertinent documents.

CHAPTER II

REVIEW OF LITERATURE

The information presented in this chapter gives a brief insight into some of the studies to date on questions asked by school children. This chapter will include: (A) a general philosophy underlying oral questioning; (B) oral questioning's relevance in the classroom; (C) development of question asking in the school curriculum; (D) development of student inquiry skills; (E) teaching procedures for teachers utilizing oral questioning; (F) definition of terms used.

A. A Philosophy of Oral Questioning

Could a person teach a person to tie a shoelace allowing that person to ask questions about the task? Could you support your ideas about why the great Indian tribes of South and Central America have ceased to exist by asking questions about the topic? The asking of pertinent questions about a topic which perhaps you know little about is difficult and often perplexing to one's way of thinking. And yet, almost all the world's great inventions, discoveries and steps in a progressing nation come because someone had a question within his mind. Children have these questions also. The child who sees

a shoelace being tied has many thoughts and questions go through his head. If this child could verbally express his wonderment, he soon would know the why about tying a shoelace. The ability of this child to ask questions would surely take some of the instruction load off the parent and probably would allow the child to learn the art of shoelace tying much sooner and retain it much longer.

It is true this might be called curiosity. But what is wrong with being curious? It seems that "children's natural curiosity causes them to raise excellent questions" (14:53) on many and varied subjects. Receiving the answers to these questions provides satisfaction for the person who is curious. And this fulfillment may lead to another event bringing about even greater thoughts. The reception of an answer not only satisfies the natural curiosity Neal refers to, but it also provides information or knowledge by relating it to his past experiences. According to Tyler:

> All knowledge is really human knowledge. All of it arises from the play of man's mind on his experiences. We have different kinds of experiences, different purposes we are trying to serve when we consider our experiences, and different ways of seeking knowledge from these experiences. (22:13)

And what could be more meaningful to the child than to receive information from some question or questions he has asked. The satisfaction of knowing you've arrived at a

solution because you asked a question aids in the retention of the knowledge gained and gives you added experiences. Basically:

> children ask questions for three very distinct reasons: to satisfy genuine curiosity; to check up on his own generalizations by the approval of a better informed person; and to get and hold the attention of others (10:28).

We as teachers should be aware of these three reasons and promote the inquisitiveness of our children or students by rewarding their questions with answers; however, not all of these need to be given, some could and should be discovered. These answers need not be lengthy but should give the child that moment of attention, approve his generalizations, and above all, satisfy the child's curiosity.

Each person has his own unique way of gaining knowledge. Some can sit in quietness reading or just pondering philosophical problems. Others must be in group discussions or have access to vast libraries, books, and films. Some find their experiences in nature or in a picture. From each learning experience comes knowledge. Learning how to do something is one type of knowledge. Man's efforts to understand something is another type of knowledge. And, as Tyler contends, knowledge grows out of feelings resulting from different experiences (22:13). Likewise, observation is a means of gaining knowledge if

we base our observations on our past experiences. Further, Tyler maintains, "An observation can be true or false.... and generalizations change as we learn more about a particular subject." Therefore, we might say, "knowledge is always a growing product of man" and there are many ways of gaining this knowledge (22:15).

It has been the experience of every parent and teacher to have questions asked of them which were difficult to answer. These questions often upset them and may even have become a cause of friction between adult and child. Some of the questions go unanswered or are poorly answered, probably not satisfying the questioner. Studies have indicated the need for answering questions of youngsters and others around us as vital experiences in the lives of many are taking place and much knowledge is to be gained. "Almost all will agree that the person who is doing real thinking is the one who will ask himself or someone else questions " (10:19). Why then should we allow these questions to go unanswered? Why do we ask children questions? Is it to gain attention? Is it to have children seriously consider them? Is it to hear ourselves as teachers talk? Maybe we do it just to dominate or to make of ourselves the centers of interest in a classroom? Are we afraid to answer questions? "The questions that teachers and pupils ask and

answer orally give insight into the progress of learning and into the types of learning which the teacher deems most important" (6:745). It is, therefore, necessary to consider every question asked you as the gaining of knowledge through an experience created to meet the needs of an individual.

In general, authorities agree that oral questioning is of great importance in the life of every individual -- not an end in itself but an asset to the learning experience. One question does not make an educated and knowledgeable man nor does one experience. It is necessary for those undertaking oral questioning as a tool not to rely on this method and this alone. For, like any process, system, or method, there is a procedure which should be adhered to and some patterns to follow for best success. Some goals must be set up and the limitations should be weighed in light of time spent, gains made, and total effectiveness with the school program. Oral questioning initated in the school program can give many needed experiences in the schools, but educators must be cautious as "people tend to perceive new events and situations as total patterns (Gestalts) unless they have a specific set to analyze and a system of categories on which to base an analysis" (20:43). The experiences and events attained through oral questioning

must be worked into the program and attached to the basic concepts of each subject area. Oral questioning, as thought of by some, should be designed to "keep the inquiry as empirical and inductive as possible, without resorting to the physical manipulation of materials" (21:31). This can be accomplished through the utilization of films. "The films [and demonstrations as in social studies and mathematics] provide a portion of empirical experience which the child must then relate to his conceptual systems" (20:45). If the demonstrations are not sufficiently developed, the child must expand them through inquiry until solving the episode. In the following sections of this chapter, procedures of the oral questioning process will be explained and their positions in the curriculum reviewed. All information related from here on will be with reference to children of fifth-sixth-grade age (ten to twelve years old) and particularly in the area of science education although other areas were used to obtain a good sampling of questions.

Oral questioning

> skills cannot be successfully taught to this age group as an isolated content area. The major focus in elementary science education should remain the content rather than the methods of science. Inquiry training [oral]questioning and abundant opportunities to attain new concepts through inquiry, however, seem to produce increments in the understanding of content as well as an important new grasp of the scientific method and proficiency in its use (20:47).

B. Relevance of Oral Questioning in the Classroom

During the past two to three years oral questioning has come under much fire concerning its practicality in education. The Butts and Jones research, "Inquiry Training and Problem Solving in Elementary School Children," has indicated both favorable and unfavorable results of elementary students using oral questioning methods. Their study defends the traditional concept method of teaching. They state:

> Much discussion has been given to the relationship between meaningful concept development and inquiry. The results of this study do not support the assertion that meaningful concept development results from inquiry training (3:27).

Meaningful concept development probably suffered most. Over a period of time, these concepts began to develop and a trained oral questioner could integrate concepts with questions making information meaningful. The Butts and Jones study, however, points out other weaknesses when the oral questioning procedures, or inquiry training as he refers to it, were put into practice. For example, he listed the following:

> 1. no relationship between IT [Inquiry Training] and changes in student's problem-solving behavior; 2. no relationship between IT and changes in student's concept transfer; 3. no relationship between IT and student's recall of factual science information; 4. no relationship between tested intelligence and the changes in students' problem-solving behaviors; 5. no relationship

> between chronological age and the changes in students' problem-solving behaviors; 6. no relationship between science factual knowledge and the changes in students' problem-solving behaviors; 7. no relationship between sex and the changes in students' problem-solving behaviors that occur in conjunction with IT (3:25-26).

These negative findings seem to condemn training students to ask oral questions or to inquire on their own, or at the least, they raise some questions amenable to and dependent upon further research. The Butts and Jones study has not, however, pointed out the shortcomings of other teaching methods nor has any mention of possible advantages been considered.

The crux of the whole problem lies not in the effectiveness of "inquiry training" or in the effectiveness of "oral questions," but rather, in the ability and training of a person to best utilize his inquiring mind to gain information through various experiences.

> If all that is intended by the inquiry method is that we should encourage a student to be inquisitive, curious, to ask questions, and to try to find answers for himself, then we are advocating no more than what good teachers have long believed in and practiced. Thus we must keep in mind that it is scientific inquiry that is being offered by some people as a paradigm on which to base a teaching strategy (15:81).

True, teachers and parents alike have long believed in the inquisitiveness and curiosity of children and have allowed children to ask questions. But what are the chances of seeing these practices in effect?

The Butts and Jones study has revealed many as-

tonishing facts. One of these facts, that teachers customarily and frequently allow question asking, inquisitiveness, and curiosity to reign in the classroom is too often neglected. Informal experimentation indicates an abundance of teacher-controlled dialogue in the classroom; and Corey, in a formal research study, found the "chances of finding a teacher talking in the classroom is about 2:1. And about 60:1 if you look for a particular pupil speaking" (6:752). In doing research for his doctoral disseration, Floyd found the teacher-pupil question-asking ratio 93:7 for 30 one-hour sessions. To further substantiate these findings he made ten all-day visitations and found the teacher-pupil ratio even higher at 95:5 (10:7). Perhaps the tendencies mentioned by Rutherford are based on opinion and are present in only our best schools today, but even this conclusion is open to question when statistical studies indicate that different situations prevail.

Oral questioning, inquiry, and information seeking are part of the natural curiosity of children. Have educators fostered this natural talent? There has been limited progress in this area. That a need to develop oral questioning by the students really exists is pointed out in Floyd's study:

There were only 232 questions asked by 802 pupils

> during the hour-long visitations. There were only 165 questions asked by the 269 pupils during the ten all-day visitations. Further, there is evidence in the data that teachers actually discouraged pupil questions. There was little opportunity for the pupils to present additional questions because of the near-constant teacher talk (9:48).

Not only was the teacher-pupil question ratio a factor, but many of the questions asked by the students were not of significant importance to the immediate discussion. "Only 114 of the 232 pupil questions were classified as 'Information Seeking' " (9:48). Since the teachers asked a great deal more questions than did the students, Floyd further classified the 6,259 questions asked by the teachers:

> (1) 42% concerned themselves with the memory of specific facts. (2) Only 1/2 of 1% were designed to call for additional pupil questions. (3) 85% were assigned to 5 categories: memory, 42%; information, 23%; direction giving, request, or command, 9%; criticism or evaluation, 87%; and comparison, 3% (9:47).

From his study, Floyd evaluated the quality of the questions asked by teachers and pupils and found that less than 10% of the questions were capable of stimulating reflection and little more than six percent of the time were questions worthy of thinking about and of answering (9:47). In general, teachers ask too many meaningless questions.

> About seven-tenths of the oral expression [in 30 classrooms] was that of the teacher while the other three-tenths were divided among the eighteen to thirty-four pupils present in the classroom. The relative activity of the pupil, then, is infinitesimal (10:69).

The predominance of teacher question asking has been pointed out by both Floyd and Corey in independent studies. Floyd also indicates that teachers not only dominate oral activity in the classroom, but generally ask low quality memory questions. This lack as a skillful questioner, according to Floyd, promotes some undesirable tension in the classroom. How these tensions can be raised is easily understood when, in his article, "The Teachers Out-Talk the Pupils," Corey points out that, "teachers ask questions at more than one per minute and allow some 38% to go unanswered while also answering their own questions before students have a chance" (6:747). These studies indicate necessary changes en lieu of oral questioning in the classroom. Even without these changes, some meaningful results have come from present use of inquiry methods in the form of oral questioning. Let us look at some of the advantages.

"Teachers tend to answer more questions than the students ask" (6:748) leaving little time during the period or day for students to ask additional questions or investigate further the responses by the teacher. "There is some evidence that the question as an instrument has been overused, misused, and abused." And "pupils are too infrequently given time and opportunity to think, to develop the expressional skills, and to ask questions" (10:40-41). There are

unproven advantages to oral questioning which must be utilized if we are to prepare students for the mechanized world in which we live and will be living. Suchman says, "we must change teaching from its old goals to new goals which foster thinking, not just retention" (19:151). It is pertinent that the children learn by doing. They should be allowed to discuss and listen to each other more and be required to listen to the teacher less. Less time should be spent parroting questions and answers from the book and giving single-word answers to teachers' questions. Children of today need to be taught how to think, reason, and arrive at conclusions.

When can a parent or teacher begin teaching a child the art of oral questioning? Havighurst told a reading conference at the University of Chicago, " 'An inquiring mind is shaped by the answers a child gets to his earliest questions.' If he is encouraged to use his mind as a learning instrument, he will form habits of inquiry and observation" (8:28). A child begins asking questions, via gestures, at a very young age. Thus, oral questioning begins early in life and should be fostered throughout the school years to promote thinking, responsive, educated people. The importance of questioning is herewith summarized:

> (a) questions are prerequisite to all thinking... (b) the question is the most important instrument used by the teacher in classroom practice...(c) questioning has an important place in all forms of teaching that are in common use in modern schools...(d) questioning deserves first rank among the legitimate teaching devices designed to provoke thought and to stimulate pupils to profitable activity...[and] (e) questioning is the medium by which a teacher may most effectively come into contact with her pupils (10:1).

Oral questioning, discovery or inquiry can be initiated into the child's curriculum at any age or grade and should continue throughout the child's schooling. Since questions are part of inquiry, Suchman's objectives are applicable as objectives for questioning. He states:

> The three major objectives of Inquiry: a) Increased productivity b) Increased autonomy c) Increased discipline (19:158). From these objectives will come discoveries which develop 1) data gathering which is intrinsically rewarding; 2) discovery strengthens the child's faith in regularity of universe; 3) discovery builds self confidence; 4) practice of logical inductive processes involved in discovery strengthens and extends cognitive skills (19:148).

When inquiry through questions leads from discovery to knowledge and greater understanding, then a worthy gain has been made in educating the child. We must acknowledge that the

> interrelationship of knowledge rests on the realization that knowledge always goes back to human efforts to do, to think, to feel. If the child is able to see the various areas of knowledge in relation to his own life, in relation to his own desire to do things, to understand things, to feel things, then we can say he understands the interrelationship of knowledge (22:14).

The relevance of any program, method, or process can be evaluated by the gains made. Oral questioning and

> inquiry for discovery's sake and for the sake of new comprehension and insight is highly rewarding to children...Inquiry becomes increasingly productive as it approximates certain standards of form, strategy, and logic (21:32).

One of the purposes of the present study will be to discuss the place of oral questioning in the curriculum, some skills and procedures for its use, and some areas where this method might be used.

C. Developmental Stages for Inquiry in the Curriculum

Integrating inquiry procedures into the curriculum seems to be the beginning place. Inquiry has a place in the curriculum because it, if used properly, benefits the learner by providing knowledge. "The purpose of knowledge in the curriculum is to help the child gain greater adequacy as a person, help him to do things, understand things, and feel more" (22:15) adequate. This would be a way we could encourage creativity within the present curriculum, encourage the attitude of inquiry, and promote the spirit of research. We should be cautious not to tell the children everything but rather allow them to find out for themselves. By formulating a set of questions for use in the classroom, a curriculum for most any subject area could be developed.

Some questions which might be adapted include: What is?; How else?; What else?; To what other uses can this be?; What would happen if?; and What else could have happened? From such questions the students can borrow from their experiences and adapt them to their needs while arriving at a solution for the question. Butts and Jones relate objectives for planned guidance in testing inquiry techniques:

> 1. To develop the cognitive skills of searching and data processing and the concepts of logic and causality that would enable the individual child to inquire autonomously and productively; 2. To give the child a new approach to learning by which he could build concepts through the analysis of concrete episodes and the discovery of relationships between variables; 3. To capitalize on the intrinsic sources of motivation: the rewarding experiences of discovery and the excitement that is inherent in autonomous searching and data processing (3:22).

"Science is the discovery of new relationships" either by accident or by discovery and:

> if we are going to teach the child how to discover meaningful patterns independently and consistently in a highly complex environment, we must teach him how to probe aggressively, systematically, and objectively, and how to reason productively with the obtained data. In other words, we must teach him the skills of inquiry (20:42).

Through development in our curriculums we can begin to instruct administrators, teachers, and eventually students, in the skills of inquiry.

Three stages of operational schema have been set up: Stage I -- Episode analysis (the verification of facts and

and conditions); Stage II -- Determination of relevance and identification of conditions necessary to the outcome; and Stage III -- Induction of relational constructs. This is the productive thinking stage in which to discover why all the conditions are necessary. This stage would include the formulating of a hypothesis and the discovery of physical principles and relationships (Operational Schema from 21:32). Stage I of the schema, the episode analysis can be divided into four separate categories: 1. object; 2. properties; 3. conditions; and 4. events (20:42).

Suchman feels "inquiry belongs in the curriculum area because it requires the performance of empirical operations, inductive and deductive reasoning and the formulation and testing of hypotheses" (19:168). The need for some guidance in this area is great as was indicated by the statistics gathered in the studies by Floyd and Corey. The first step must be the inclusion of inquiry in the curriculum ; then, as has been suggested by Floyd, "inservice and pre-service instruction in how to ask questions" (10:142) for teachers and teachers-to-be. This instruction would give teachers confidence when working with questions and procedures as described in the next two sections.

D. Inquiry Skills

Developing skills for inquiry, thought of here as

questioning, takes considerable time and effort when working with children and even more time when working with adults. Having the know-how of asking good questions is of paramount importance in the field of education. And yet, so many instructors are completely inadequate at asking questions either orally or written. There is some indication that better questions, being thought out and organized, might be of longer length. Corey states, "there is some evidence that good questions are more complex and hence require longer sentences" (6:751). However, there is no substantial evidence that this is true. Experimentation for this paper, to be explained later, will attempt to verify this one way or the other. Regardless of the length of the questions, it is the end result or skills which are important. One skill which comes from questioning is "discovery". When a child can gather information using broad concepts, he is more likely to recall that information for a longer period of time.

> There is a way in which autonomous recognition of relationships by the pupils, i.e., 'discovery,' can and should be combined with expository introduction of concepts in an efficient program. This will produce understanding rather than rote verbalization (1:45).

Oral questioning is designed to: 1. supplement the ordinary science activities; 2. give the child a plan of operation through discovery; 3. the child learns to formulate hypotheses

by verbally testing through experimentation and learns to interpret the results; and, 4. oral questioning makes the pupil more independent, systematic, empirical, and inductive (20:42). The child does not need to know, but rather, "a child needs to know what he is interested in" (22:19).

Along with discovering and becoming systematic, the child also needs to gain knowledge. Knowledge is hard to correlate with the various programs of our schools.

> The problem of interrelationship of knowledge is difficult for children: 1. Children don't have enough first hand experiences, 2. School activities don't correlate with these activities out of school, 3. Too many subjects approached the same, 4. Textbooks don't allow interrelationships of knowledge (22:16-17).

It is true, that children don't have the first-hand experiences that are necessary for a complete, well-rounded background. We as adults must take time to provide these experiences and reveal the necessary details enabling understanding and use of knowledge. In our schools it is not possible to correlate all of the activities but we can do a much better job than in the past. If each subject area were not approached from the standpoint of rote memorization, then the discovery of knowledge would allow children freedom of learning, not just as the textbook states, but as they have experienced it. Tyler has developed four guidelines to improve the interrelationship of knowledge:

> 1. Knowledge should be related to child's curiosity and problems of knowing. 2. Child should discover to find out for himself. 3. Subject should deal with real problems, with questions or experiences of the child. 4. Extend use of knowledge for future (22:17-18).

Discovery and the ensuing knowledge are basic to inquiry and, if sufficiently developed, can be gained through oral questioning with related experiments, demonstrations, or films. Inquiry alone cannot provide the incentive for children's learning. "Inquiry for inquiry's sake is apparently non-rewarding. Children quickly lose interest. But inquiry for discovery's sake and for the sake of new comprehension and insight is highly rewarding" (19:163). "Inquiry [especially in science] poses problems of causality" (19:151). Through questioning, these problems can be understood and the causes organized through inductive and deductive methods. Bruner states, "discovery should be organized so the learner can learn best through problem solving." He further suggests, "learnings gained through discovery may be more accessible to the learner later on" (19:148). Dewey may have said learn by doing or we discover things by experimenting and thinking. This compares with inquiry posing problems of causality and the subsequent solving of the problems.

Oral questioning, inquiry, inquiry method, and inquiry training are terms which should not be confused in

working with students. Inquiry training is basically the skill and know-how of inquiry as pertaining to a given situation. Inquiry training is knowing how to ask questions, when to ask, and how to combine other experiences with your questions to meet the problem or problems facing you. However, "inquiry as a technique is not absolutely necessary to an understanding of inquiry as content" (15:81). There are many methods of inquiry, through reading, first-hand experiences, or creating. Generally, inquiry requires the forming of a question to answer. When the question or problem is known, then oral questioning can be used as a method of inquiry to arrive at the answer.

> The phrase 'teaching science as inquiry' is used to refer to a particular technique or strategy for bringing about learning of some particular science content. This is the meaning associated with the 'inquiry method' (15:80).

Neal, in writing about scientific inquiry states these as:

> subsidiary objectives needed to utilize consistently scientific inquiry leading to critical thinking: pupils need to acquire basic knowledge; certain attitudes; and methodology (14:53).

Neal continues by saying that transfer of learning of methods must be provided if scientific inquiry is to function properly. He, along with Suchman, have set up steps for developing skills of scientific inquiry. The techniques proposed by Neal are for the development of comprehensive methods of scientific inquiry. They are: "1. recognize problems;

2. selecting adequate data; 3. formulating hypotheses; 4. formulating conclusions; and 5. applying conclusions and methods of scientific inquiry" (14:53-55). These techniques follow the basic steps of scientific procedure commonly used by scientists and experimenters. Suchman states three principles of helping children build inquiry skills. The child must first structure a general operational schema for inquiry (note page 18). Second, the inquirer must have guided practice in gathering data and constructing explanatory systems. And, thirdly, he must make periodic critiques of his past inquiries, reviewing what has gone on before (21:31). From the teaching standpoint and from an inquirer's frame of reference, some guidelines for discovering various causes is needed to get oral questioning under way. Suchman asks three questions in leading into the procedures of inquiry and specifically of oral questioning: 1. Where do you begin? 2. What kind of information do you need first? and 3. What is an adequate explanation (19:153)?

E. Teaching Procedures for Using Inquiry

According to Tyler, we tend to look at the world from one vantage point (22:16). Our visions are narrow -- our methods of teaching and the goals of learning for the students are concrete and immoveable. We as teachers should

become aware of the needs of our students. We should begin helping the student. As teachers we spend most of the available class time talking and primarily asking questions. "The fact that so many of the questions asked by the teachers required the use of memory in answering suggests that memory is of major significance and might be the goal of instruction" (10:138). Instead of making memory the significant factor in learning, we should allow the student freedom to gather what facts he or she desires and from these facts formulate the knowledge necessary to handle various situations. If we can develop thinking and understanding concerning concepts, then knowledge will be a kind of second-nature thing for the student. "Knowledge of subject matter is important but our purpose in teaching is to help children arrive at understanding of knowledge that is meaningful to them" (22:19). Since knowledge results from different kinds of experiences, "we need to be sensitive to this point when we seek to identify the knowledge that is relevant to a problem or an experience" (22:14). Experience can be gained in many ways. We as educators need to provide experiences in as many ways as possible and we need to increase our perspectives for fostering learning. One such way is that of inquiry through oral questioning.

Instilling ideas in the minds of learners and teaching them to utilize these ideas to build concepts will

improve the inventiveness of our students. Although:

> an invention is not complete and static, but it is the germ of a concept that is developed to greater significance by the subsequent discoveries. When an invention is made, its full significance is not evident. Still the concept must be introduced and the invention must be made, if it is to grow in meaning (1:45).

To allow invented meanings room for growth is the aim of oral questioning, in that, new realms of discovery will be uncovered by the students. As educators, we tend to quell the questions which students have. Floyd, in his study of oral questioning, found that "there is some evidence that the questioning tendency of pupils is not kept alive even though it has been found that pupils are capable of asking good or better questions than teachers (10:42). His study further indicates "the fact that nineteen of the thirty teachers [those whom he observed] asked more than three questions a minute is a matter of considerable importance" (10:75). True, teachers do most of the talking and an exaggerated amount of the question asking. It isn't any wonder that children are not skilled question askers or extraordinary inquirers. Teachers and parents have stifled their desire to ask questions.

> Indeed, it does not seem crucial to teach the children to invent concepts, because they can and do invent concepts readily. The educational problem, rather, is to teach the children to carry out their creative thinking with some intellectual discipline (1:47).

This can be done through inquiry and the natural stimulus

children receive from daily experiences. If we allow the child a chance to discover for himself then he will find the concepts and facts necessary for understanding.

> Discovery teaching appears to be strongly motivating and rewarding...the teaching seems also to be reasonably efficient even when compared with a more verbal expository approach. The pupils come to the point where they know they will discover something and they know what their discovery will mean. Hence, perhaps they did not invent the new concept, but they did make discoveries (1:51).

Discoveries can be made through oral questioning but only when the student is allowed freedom to respond when he desires information. "It must be remembered that the techniques of questioning are far from correct if all or nearly all the questions are asked by the teachers" (10:120).

A typical teacher works hard to achieve those goals outlined by each unit of study. The assignments, reading, films, projects, and other activities are followed through to the conclusion of the unit. Seldom during this time are the students given time to ask questions and at the end of the unit, they are asked to parrot back answers from rote memorization. In visiting what he termed the normal teaching situation with an average teacher presiding, Floyd found:

> pupils' natural spirit of inquiry was not being fostered, encouraged, or expanded by these teachers. In fact, its development was hampered under the conditions revealed in the present study. The pupils, moreover, were not being made to see that it was their privilege and responsibility to ask questions. They did not seem to feel free to ask questions nor did they seem to see any particular reason to do so. The pupils, further,

> seemed to lack knowledge of the value and the purpose of the oral question and they used it in a very limited fashion (9:50).

Not all questioning by the teacher is bad nor are all questions from students meaningless. However, "questions asked in class [by the teacher] should require pupils to reflect, to make inferences, and to develop generalizations" (6:752). Floyd, referring to Haynes' study indicated that more experienced teachers ask fewer questions (10:30-31). Romiett Stevens, in her study "The Question As A Measure of Efficiency" (17), found that a large number of questions, with few exceptions, is a valuable indicator of bad instruction in the classroom; however, she also concluded that a small number of questions does not necessarily indicate good teaching. Generally, many numerical facts are available which can be used to arrive at an evaluation of each student. In view of this:

> teachers have little access to child's reasoning processes unless the child is talking about rather than exploring a piece of equipment. In this way the teacher gets a clearer picture of how the child is thinking (21:31).

If the child is not given an opportunity to express the discoveries he has made, the evaluative process becomes quite difficult and least of all very adequate. The following ideas and procedures will, somewhat, outline the practices of oral questioning used by several educators as a

means for improving students' discovery, problem solving, and experience. Their methods combine to form an outstanding teaching tool which should be incorporated into today's curriculum.

The steps and recommendations of these educators can and should be modified to best meet the needs of students. Several of the ideas stated should remain rigid and exacting. Some of the procedural ideas will be questioned and others readily accepted. In the Suchman approach to inquiry, the "children are led through a programmed sequence of problems designed to make the exciting experiences of independent discovery virtually inevitable" (19:147). The films used are single-concept films showing a discrepant event. A question is posed for the students to answer. There are generally several routes leading to the final answer. These films or discrepant events (can be a demonstration) are usually shown to the entire class. They may be shown to a small segment of the class and oral questioning about the event can take place with the entire class or in small groups.

> At the fifth-grade level, ten seems to be the optimum group size. With classes of thirty or more, the remaining children serve as nonparticipating observers who have an important evaluative role. Rotation permits all children to participate in turn. The training [inquiry sessions] sessions are about one hour long and thus far have been held at weekly intervals, although we now believe that more frequent

> intervals and shorter sessions would be desirable (20:45).

Regardless of the group size or time spent with each group, the "teachers need to create and use techniques that develop critical thinking abilities" (14:53). To do this:

> the teacher must abandon his traditionally directive mode and structure an environment that is responsive to the child's quests for information. The teacher must see to it that the child is able to obtain the information he needs, and that he does discover new concepts on his own. The teacher can help the child by posing problems that are reasonably structured and will lead to exciting new discoveries...The educator should be concerned above all with the child's process of thinking, trusting that the growth of knowledge will follow in the wake of inquiry (19:151).

It has been found that the slow learner can gather sizeable amounts of information using inquiry and the gifted can benefit from inquiry if encouraged to formulate a systematic way of gathering data. In either case, confusion should be avoided.

Teachers resent having great volumes of questions thrown at them from extremely inquisitive students. They feel uneasy with the inquiry method because they don't know all the answers. It is true, to use inquiry, teachers must have more than adequate knowledge.

> Until science teachers have acquired a rather thorough grounding in the history and philosophy of the sciences they teach, this kind of understanding will elude them, in which event not much progress toward the teaching of science as inquiry can be expected (15:84).

Because inquiry attempts to bring oral questioning back to the student rather than have questioning a teacher-dominated affair, teachers must be ready to relinquish class time to the students.

When beginning a session of oral questioning, an event or problem is presented. This can be done in a variety of ways. Some rather good films have been produced for inquiry purposes.

> The intermediate-grade children are shown short motion pictures of simple physics demonstrations that pose problems of causality. They are then asked to construct an explanation of the demonstration to show why it had the results it did. In order to move toward this goal, the children must be able to obtain information not shown in the film. They do this by asking questions to gather data. These must be asked in a form that can be answered by 'yes' or 'no' (21: 31).

> The questions are restricted to the 'yes' or 'no' format to eliminate open endedness and teacher-structured answers and to assure that the direction and control of the data flow are always in the hands of the children (19:152).

Many of the questions coming from the students are merely guesses, but many of them can be guided or changed into hypotheses. Hypotheses, of course, are educated guesses about the event or what will happen in experimenting.

> 'Yes' or 'no' questions are hypotheses. The teacher in answering merely establishes the tenability of the hypothesis. Questions not answerable by 'yes' or 'no' may be continued by saying, 'That all depends' or 'Tell me more' (20:45).

Getting the students to begin asking questions is sometimes difficult; but once they begin and realize that they may ask whatever they wish about the problem, it is sometimes difficult to stop the session. Throughout the session, oral questioning is the main source for gathering information. The film or demonstration can be shown over if students desire, however:

> The idea is to keep the inquiry as empirical and inductive as possible, without resorting to the physical manipulation of materials. Children are restricted to data gathering processes operating inductively to test their hypothesis through verbal experimentation" (19: 152).

On the other hand, some sessions may be built around the handling of various types of materials. The children may solve these problems by utilization of the materials. This is recommended later in the oral question training period. The child should first become adept at handling problems by formulating and asking questions orally. Although "active participation in the questioning is voluntary" (21:32), the children should become autonomous inquirers.

Time limits for inquiry sessions are not usually established as the responsiveness of the group more or less regulates the length of each session. The entire time is spent having students ask questions, testing and eliminating hypotheses.

> Such questioning continues for about thirty minutes as the children gather data, identify variables and determine their relevancy to the problem, and formulate hypotheses of cause and effect which they test experimentally. No data are given that the children do not obtain through observation or from teacher's 'yes' or 'no' answers to their highly structured questions (20:42).

"When students are allowed to ask questions, a whole new cluster of questions arise about their immediate experience" (22:18). We must during this time seek application of the knowledge that has been gained through question asking. To accomplish this, "the teacher must always put the responsibility for arriving at an answer back on the student. The child should not be allowed to test hypotheses directly" (20:46) but rather use questions to justify any hypotheses that have been formed. From this point, assuming the hypothesis correct, the student should begin to form a theory. "A good theory stems from successful inquiry and generates additional ones" (15:82). While developing the theory or theories, the student will use experiences, discovery, concepts, and to some extent invention in verifying the new theory. The theory will probably be an old theory discovered by the child. But to the child this discovery is a new concept which he never has encountered.

> In the development of a concept, it is useful to distinquish the original introduction of a new concept, which can be called invention, from the subsequent verification or extension of the concept's usefulness, which can be called discovery (1:45).

> The inquiry session is terminated by either the achievement of the objectives, the inability of the children to proceed without further conceptual development, or the expiration of time (20:46).

In any type of teaching situation, it is difficult to measure the gains made. Testing and evaluation must stem from what should have been learned in terms of application of principles and how these terms are used in arriving at the answer.

> Following the question-asking session, the subject is given a paper and pencil test designed to measure (a) what principle he has discovered through the inquiry; (b) which of the necessary conditions he could identify and how accurately he could identify them; and (c) how many objects, conditions, and events of the episode he had positively identified or correctly assumed (19:164).

Another evaluative form is that of recording all responses made during the question-asking session. In this study, tape recordings were used exclusively as the tool. This recording provided a permanent record of all comments made for use as an evaluative measure and to count and evaluate the questions.

> By tape recording the inquiry sessions, the feedback allows reinforcement and evaluation of the questions as well as help the student formulate inquiry strategies.. These feedback and reinforcement sessions have been very useful in drawing the children's attention to the importance of the heuristic process, something which children typically ignore because of their great interest in the product and the solution or explanation (21:32).

The principle function of the critique is to correct weak-

nesses in the inquiry of the children and to build up a variety of tactics that will increase their accuracy and productivity. When the evaluative critique is not used, student morale drops and inquiry becomes less effective. Suchman established three basic teaching techniques for inquiry use: 1. Operational schema; 2. Guided practice; and 3. Feedback and reinforcement (19:161-164).

Floyd, in his study earlier referred to, quotes the works of Stevens and Gatto. From Stevens comes a criteria describing a good question:

> 1. A good question should stimulate reflection. 2. A good question should be adapted to the experience of the pupils. 3. A good question should draw forth a well-rounded thought (10:6-7).

From Gatto, Floyd mentions this opinion:

> ...questioning by pupils should receive more encouragement than it probably does in the average classroom. He [Gatto] states that the favorable comparison of pupils' questions with those of teachers and textbooks would suggest the advisability of permitting a considerable participation of pupils in questioning (10:26).

The major portion of educators who have investigated oral questioning find a tremendous lack of it by students in the classroom. They have found a positiveness about this method in that all students can participate equally regardless of their level. It is the hope of this study that further light will be shed on the subject of oral questioning. The "technique is predicated on the belief that the drive to 'find out why' can surpass in sustained motivational power almost any

other classroom incentive" (20:45). It is felt that:

> children can develop the abilities to utilize methods of scientific inquiry through the use of a variety of techniques and guided experiences designed to achieve the important objective of science education. Since there are many methods of inquiry, children should be taught to use many kinds of procedures appropriate for the development of critical thinking activities (14: 55).

F. Definition of Terms Used

Some of the terms used in this paper have several workable definitions, all of which may apply to oral questioning. In the next few pages, an explanation of terms as they will be used in this paper will be given.

Causality -- This is the relation of cause and effect as related to a specific event or happening. An example of causality can be found as the main operation of cause as a principle or fact of nature. It may be the necessary connection of events, using time as a sequence, to arrive at the relationship between cause and effect concerning a particular event.

Concept -- This is the building of a mental image of a thing formed by generalizations from particulars to a broad idea. Through questioning, the student can gather particulars. The particulars then can develop into a theory or a broad concept. Understanding broad concepts is the basis of science, if not all areas of education. This also

may be a shortcoming of the oral question method, as too often the particulars are arrived at by the students but the over-all idea or "concept" is not.

Deductive -- This is the opposite of inductive reasoning in that the thinking here is from the general happening to the specific details that caused the happening. Oral questioning has made a great deal of use of this procedure.

Discovery -- Dictionaries state "discovery" as obtaining for the first time sight or knowledge of some fact or object which exists already, but is not perceived or known. Adapting this to students learning, one might say, discovery is finding something which is a new experience and which has, until discovered, been outside their scope of learning.

Discrepant event -- An event which appears to have happened contrary to the laws of science. These events are used to develop the students' thinking processes, leading to the discovery of every possible reason, fact, and condition of the experiment. The unusual appearance of a discrepant event develops the utilization of many theories, laws, and empirical events previously learned by the student.

Empirical -- Empirical is used here as referring to knowledge gained through observation and/or experiences which the learner can call his own. These experiences are

not usually supported by scientific facts or theory, however, some experimenting may lead to empirical knowledge.

Heuristic -- Heuristic is derived from the German word "Heuriskein," which means to discover. The meaning of the word as used in this paper applies to arguments and methods of demonstration which are persuasive rather than logically compelling, or which lead a person to find out for himself.

Hypothesis -- This is a tentative theory temporarily adopted to explain facts and acting as a guide in the investigation of other facts. It is at best, an educated guess concerning some basic happening. When sufficient facts are found, the existing hypothesis becomes a theory. Further substantiation of this theory through increased knowledge may lead to the making of a law. Many student questions are stated in the form of a hypothesis. The students should be encouraged to investigate their hypotheses by asking questions to support each hypothesis. With sufficient information students may arrive at a workable theory or solution to the question or happening at hand.

Inductive -- In oral questioning, many facts are gathered. When these facts are consolidated into a general theory then induction has taken place. This reasoning from specific to general is of great importance in using the

oral question asking method. Much of the inductive thinking, as thought of here, is the handling of facts and relating those facts to an event. When the students' thinking has been led from specific facts to the meaning of the main event, then induction or inductive reasoning has taken place.

Inquiry -- By definition, this word means to seek truth, information, or knowledge. Reference is made to investigation, research, and examination into facts or principles. In this paper, the word "inquiry" will refer to the seeking of information through interrogation. The question asking will come from students, unless otherwise indicated, as the school program and teachers involved should cater to the students' inquiries.

Inquiry training -- As thought of here, this training makes reference to the inquiry described above. The connotations utilizing "inquiry training" will mean that skill needed by the students for asking questions enabling them to gain knowledge, information, truth, or to substantiate any hypothesis or theory they have.

Invention -- Invention is usually thought of as making a significant discovery. As thought of in this study, "invention" will be the putting together of discoveries into concrete facts or theories. Invention, then would be the process of discovery and subsequent proving

of a theory or hypothesis correct. Although the theories the children deal with have been substantiated many times and often scores of years ago, it is a new discovery for them and, hence, a new invention.

Knowledge -- Utilization of observations, experiences, and facts through developed skill leading to understanding or a clear perception of an idea is knowledge. An accumulation of facts is not necessarily having knowledge; but if these facts can be used in developing complete understandings, then the facts can be classified as part of knowledge along with the broad understanding.

Oral questioning -- Use of this phrase has been made several times in the study. This term, used in this paper, can be synonomous with "inquiry." Since the study itself deals with numbers and types of questions used by students, attempts have been made to discuss inquiry as oral questioning. It must be understood here that practically every question becomes inquiry of some form or another, however, not all inquiry has to be a question. Most inquiry stems from a question or questions but it can be reading, observing, or performing experiments.

Theory -- A theory developed by students and as referred to here is a principle established after analysis of a set of facts in their general relation to one another. For the students, we say, they know have an idea of how

something works and can substantiate the functioning with back-up knowledge or facts.

CHAPTER III

PROCEDURES FOR GATHERING DATA

This chapter is divided into three main sections: (A) information having to do with the group as a whole and the classroom and building setting; (B) the gathering of significant test results; and (C) recording of classroom activity. The latter two divisions will be dealt with in detail. The significant data necessary for this study includes measures of intelligence, achievement, personality, and sociability. Some explanation of how these measures were gathered and compiled is related in this chapter. The last section of this chapter is concerned with the gathering of classroom activity through tape recordings and the use of a stenographer.

A. General Group Information

Data for this study were gathered at Normandy Park Elementary School in the Highline School District near Seattle. The school was located on a large tract of ground affording more than ample play areas. The site, the eleven teachers, librarian, music instructors, and a speech and hearing teacher provided a well-rounded program. Art, demonstrations, displays, vocal and instrumental music, intramural and inter-school sports, and other related programs

furnished many opportunities for these youngsters.

The classroom, where the question data were recorded, was located at one end of the building near the playground. The room was of rather plain design. The floor was linoleum tile; and the sloping ceiling was acoustical tile. The east wall was completely glass from floor to ceiling; while the west wall, the highest wall, was of wood construction from the floor to the top of the hall door and glass from there to a height of about fifteen feet. The other walls were plaster finished -- each having a chalkboard and bulletin board space. The students generally face south but several room arrangements were in effect during the sessions. The classroom was almost self-contained, in that a drinking fountain and sink facility were located in the room. Several large tables provided the room's work areas; and two coat racks and accompanying book shelves provided for daily storage. The design of the room afforded little permanent storage in the thirty-by-thirty-foot classroom. Two doors, one leading outside and the other opening into the hallway, provided entrance and exit from the room. The three small windows which open were not sufficient to properly ventilate the room. Relating the room to this study, it can be concluded that the acoustics were not the best (the room being rather noisy with the moving of wooden chairs and desks and

the shuffling of feet) and the inconsistent temperature and stillness of the air possibly stifled the students' responsiveness although probably no worse than in some other classroom.

The group was made-up of seventeen fifth-grade students and fourteen sixth-grade students. The fifth-grade group, composed of seven girls and ten boys,along with the nine sixth-grade girls and five sixth-grade boys constituted the class of thirty-one students. No changes occurred in the class enrollment. The average age of this group was ten years eight months, the girls averaging eleven years of age and the boys averaging ten years six months. The age statistics of the group will be discussed further in the chapter on findings.

Students of this area were very fortunate, living in high-middle-class homes where most parents have college backgrounds. In about half of the homes, both father and mother hold college degrees; and many of this group have done graduate work. The majority of the fathers were employed by Boeing Airplane Company. The others were professional or white collar workers with a few of them owning private businesses. Large homes, wooded areas, access to saltwater beaches, fresh water streams and several swimming pools provided the students with a well-rounded background.

Further support from the home came in providing experience for the students in the form of art, music, dance, concerts, ballet,and travel throughout the United States, Canada, Mexico, and in some cases Hawaii and Europe. In general, the homes provided experiences which allowed the student a greater understanding of the things around them.

B. Gathering Significant Test Results

This study was designed to determine what the relationships between achievement, intelligence, personality, and sociometric measures are as compared to the number and types of questions asked by children of a fifth-sixth-grade class. Because of the nature of the study, it was felt the standardized tests given by the district would supply adequate data for such a comparison. Related here are the means through which the test data were gathered.

1. Achievement test data were taken from the Metropolitan Achievement Test given to each of the students while in the fifth grade (note appendix A). The test was given to the entire group by the teacher and was scored by the district. All scores were figured in relation to the entire district and all percentile scores were based on district standards. Four basic areas were tested and the scores and percentiles computed. The areas tested were: reading, arithmetic, science, and social studies. The results of

this test were reported by numerical groupings only and utilized the percentile score and not the actual number right score as the tests have differing values and numbers of questions.

The fourteen sixth-graders in this combination class took the test during the winter of 1965 and the seventeen fifth-graders took the test during the winter of the 1966-1967 school year. Both test results were determined while the students were of approximately the same age and in the same manner as related above. The reliability of this standardized test makes this a useable measure for determining the achievement rank order of the thirty-one students.

2. Another test, the Lorge Thorndike Intelligence Test, given to the groups while they were in the fourth grade provided verbal and non-verbal scores. This test was also scored by the district and scores were computed from the district norms. Fourth-grade teachers administered the tests to the groups in the classroom. Since this was a study concerned with oral questioning, major emphasis was placed on the verbal test results where the highest score attained was 142 (99th percentile) and the lowest score was 101 (37th percentile). The scores aided in ranking students for comparative study with others in the class.

3. It was felt that the personality of each individual student may be an important factor in how any one

student responds in the classroom. The goal of the researcher here was to obtain a standardized score which would rank the students with others in their own group. Since the district did not give a test of this nature, the California Test of Personality was given to the class. This group test was given in the classroom during the final week of school after permission had been granted by the parents of each student. Using a standardized key to determine the number correct of the 144 questions on the test, the students were ranked from first to thirty-first. The test was scored by this researcher and the twelve battery scores were added together. Actual test scores were referred to only if significant implications could be drawn from the score. In all findings related, the rank score was used. Comparisons were by group, grade, and sex, as related to high, low, and median rankings.

4. Social pressures on children and adults are very great, especially when others are constantly rating your oral contribution. Of course, this takes place in the classroom. What effect does social pressure have on oral questioning? A portion of this study aided in determining significant information concerning social measures. To set this measurement up, a rather simple ten question test was developed with the help of the school psychologist. The first two questions were of a general nature concerned with

name and telephone numbers. Four sets of additional questions, asked from both a positive and negative aspect, were asked about the student's friends at school and play (note appendix D). Two identical tests were given to the entire class. The first test being September 29, 1966. The second test was administered on March 8, 1967 during the same school year. Identical instructions were given both times and the test was administered at the same hour of the day. All of the students were present for both of the tests.

After the tests had been given, the students selected by fellow students for each question were given a point value. If the student was the first (of three) choice on a positive question, he or she received three points. A second choice received two points and a third choice received one point. The same procedure was followed for the negative questions, however, points were deducted from the total score. For a first choice three points were taken away, for a second choice two points, and for a third choice one point was subtracted from their score. Using this format, it was possible for a student to gain many positive selections, many negative selections, or a mixture of both and end up with a very high or low score. Others received few choices and ended up with a low score. As on other tests, the numerical score was not consistent

with the four measures described thus far. The rank score then became the important factor in rating the results. Any exceptional deviances were analyzed and taken into consideration in relating the findings. This test gave a measure of each individual's social stimulus value and was an index of acceptance or popularity in the classroom. The above mentioned rankings were done as per group, grade level, and sex when comparing with the number and types of questions.

C. Recording Student Questions in the Classroom

Perhaps the one most efficient method of gathering all the questions in the classroom was to record the activities which took place. Due to the importance of every question in the final study, the tape recording method was used. Because of the equipment available, the taped results were not the best; however, the questions of the students were discernible. The sessions were set up during the summer of 1966 prior to the school year and were scheduled about a month and a half apart. There were seven tape recorded sessions and seven sessions recorded by a stenographer. The tape recorded sessions were set on Thursdays preceding the stenographer sessions which were on Mondays. The tape recorded sessions were all on science lessons, while the stenographer sessions constituted a variety of subjects but always during the same hour of the

school day. Seven sessions, using each procedure, were recorded to insure a minimum of twelve hours of classroom activity.

1. Tape Recorded Sessions. Selection of dates for the tape recorded sessions was arbitrarily set according to the school calendar. An attempt was made to avoid holidays and vacation times and still allow five weeks between sessions. These dates were to be flexible enough to avoid excessive absenteeism, school programs, technical difficulties, or even the possible absence of the instructor. After careful consideration, the following Thursdays were decided upon: September 8; October 20; December 1; January 5; February 16; March 30; and May 11 of the 1966-67 school year. The sessions were to be conducted during the same time (10:30-11:30 approximately) and were to be of no special preparation limited to the science area. If a work day was planned for the students, then that was done. Of the dates listed, three necessitated change. The January 5 session was delayed because of the nearness to Christmas vacation time. It was recorded on January 19. The February 16 session was rescheduled for February 20 because of excessive absenteeism; and the March 30 session was recorded on Friday, March 31 because of tape recorder problems.

The equipment used during these recording operations

consisted of one Wollensak Tape Recorder placed on a moveable cart centrally located in the room. Standard Scotch Magnetic Recording Tape was used on large hour-plus length reels. This avoided any changing of sides or rewinding during the sessions. A twenty-five foot microphone extension was used by the instructor allowing easy access to any place in the room. This was necessary because of the low quality pick-up on the tape.

All lessons for the tape recorded sessions were science lessons although some other lessons appeared because of changes or carry-over lessons, questions, or discussion. The majority of the activity recorded was science. The lessons were not planned especially to be recorded and were taken just as they appeared in the unit plans. The objective here was to record the needed classroom activity under as near normal circumstances as possible. The students were aware that they were being recorded but were not informed that it was for this study. Some of the tapes were used for evaluation and reinforcement during following days and none of the students were denied hearing the tapes if they so desired.

On each recording, an introduction by the instructor stated the time, date, and lesson used. Any conditions, such as, weather, activities, previous happenings, and possible reasons for students being absent were recorded ahead

of time on the beginning of each tape. Each tape recorded session followed the morning recess (10:15-10:30) and was started when the class assembled at their desks. The recorder was started before the instructions for the session were given and all dialogue was recorded (even the movement of the class with their chairs). Once the reel of tape was started, all activity was recorded. When the tape had run once through the recorder, the session was considered complete. The tapes varied but all were near the one-hour length.

No attempt was made to record any conversation, questions, or commotion not directed toward the teacher or directly related to classroom discussion. The primary concern here was the number and types of questions asked by the students and the number of questions asked by the teacher.

2. Stenographic Sessions. The dates for the stenographic sessions were set to follow the tape recorded sessions. These sessions were scheduled on the following Mondays: September 12; October 24; December 5; January 9; February 20; April 3; and May 15 of the 1966-67 school year. Each session was in the afternoon following the noon recess beginning shortly after one o'clock. The sessions ran for at least one hour and sometimes longer. The schedule allowed time for the instructor to confer with the stenographer

during the lunch hour and to review the session during the afternoon recess. Having a stenographer necessitated the following of a rigid schedule.

Upon arrival in the classroom, the stenographer was briefed on the type of lesson and subject area to be covered. A seating chart was drawn with all students' names and places shown. Any absentees were marked; and students with quiet voices or other speaking problems were indicated. It might be noted here, after the second session, the stenographer was quite familiar with the names and faces; and the students were quite relaxed with the presence of the stenographer in the room. The stenographer was placed in a strategic location near the outer perimeter of the room near the place where most of the discussion for that day took place. Recording of questions by the stenographer began immediately upon the call to order by the teacher. Only the questions of the students were recorded (in shorthand); while other conversation, if deemed necessary, was taken down by the stenographer. Few conditions of the room were noted; however, the short follow-up sessions allowed the teacher and stenographer time to share things the students had done or said.

An attempt was made to keep the stenographic sessions at the same time during the school day and to vary the sub-

jects taught during her visitations. This was done to give each student an equal opportunity to respond in an area of his or her preference or ability. The activities included these subject areas: social studies, music, English, spelling, creative writing, and mathematics. The methods used in teaching the various lessons were of general preparation and little, if any, attempt was made to encourage questioning. One or two of the sessions did employ the use of inquiry techniques, but for the instructor inquiry was a method utilized in classroom instruction.

Each stenographer session was completely evaluated two or three days later. This gave the stenographer time to transcribe the shorthand notes. At that time, the teacher and stenographer would go over the complete set of responses and make any necessary corrections or changes. No attempt was made during the school year to tally the number of questions in any one session or from session to session. All compiling and rating of questions was done after the completion of the final session.

3. Comparison of the Group and Questions Asked. The recording and stenographic sessions did not seem to bother the responses of the group. Most of the students had had previous experience with tape recording, and room visitors were not uncommon in the school. No attempt was

made to conceal or in any way make less obvious the recorder or stenographer. Nor were room disruptions minimized beyond the normal. The group was generally quite responsive and proved very friendly toward the stenographer.

The questions, taken from the tapes and stenographer's notes, were listed under each student's name. For purposes of this study each question was analyzed and classified by type into three categories: thought, memory, and other. The Gatto classification system as revised by Floyd was kept uppermost in mind while individual questions were classified. To facilitate classification in this study, a thought question was one that required more conscious and deliberate effort on the part of the child, went beyond recall, and had one or more of the following outstanding traits: imagination, insight, analysis, interpretation, causal reasoning, comparison, criticism, clarification, and evaluation. Memory questions were thought of as questions involving recall without any or much conscious effort, questions stemming from an emotional reaction, such as, those expressing strong feeling, an impulse toward action, fear, disgust, or surprise. Additionally, memory questions were classified when it was felt that the information had likely been previously presented and the knowledge should have been retained. Questions categorized as "other" were not specifically

classified into subgroups for this study.

The researcher was aware of the presence of overlap and acknowledges the fact that other researchers would and could classify the same questions differently; nevertheless, this was the procedure followed in this study.

The questions then were evaluated according to the types determined through classification and totals were indicated for each student. This total was used to compare achievement, intelligence, personality, and sociometric test rankings as earlier determined. The aim of this study was to see if there was any significant relationship between achievement, intelligence, personality, and sociometric test scores and the number and types of questions asked by children of a fifth-sixth-grade class. Further comparisons were made according to age and sex of each student. Another valid and conclusive comparison made was the student-teacher ratio of questions asked during each session and the ratio of questions asked by each.

CHAPTER IV

FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The relationship between achievement, intelligence, personality, and sociometric test scores and the number and types of questions asked by students of a fifth-sixth-grade class was studied to determine if any general conclusions could be made concerning quality and quantity of questions asked. The process of evaluating the questions was done en lieu of each question's appearance in the context of the classroom activity. Further, some disruptive classroom conditions existed but as near normal conditions and procedures as can be expected prevailed throughout the study.

This study attempted to verify questioning activity in the classroom and was concerned with the following generalities as related to students' questioning:

A. What was the teacher-student question ratio, and the teacher-student rate of questioning during the fourteen session duration?

B. What do the comparative achievement and question asking abilities indicate?

C. How does questioning compare with certain defined intelligence measures?

D. How might individual social stimulus values affect quantity and quality of oral questioning?

E. What relationships can be made between personality measures and question asking?

F. Do the chronological ages of students affect questioning within their individual class group?

G. Who asks more and better questions, the boys or the girls?

This chapter was organized around the seven questions asked above. The conclusions, implications, and recommendations were given along with the findings.

Specific students in the study were referred to, using the following code: the first numeral indicates the grade; the letters "M" and "F" found in the middle indicate male or female; and the last number designates the specific student. Additional data on each student can be found in appendix A, which is a compilation of the number of questions asked by each student per session and the breakdown by sessions of thought, memory, and other questions asked. Achievement, I.Q., personality, social, age, types of tests used, and other additional information is also listed in the appendix.

A. WHAT WAS THE TEACHER-STUDENT QUESTION RATIO, AND THE TEACHER-STUDENT RATE OF QUESTIONING DURING THE FOURTEEN SESSION DURATION?

Findings. The fluctuations evident in the number of questions asked in each session varies with the method used in presenting the lesson that day. Recorded sessions three and five were general work periods. Recorded session seven and stenographic sessions three, six, and seven consisted of student inquiry. Stenographic session five was a committee report for social studies and was followed by student questions and a time of evaluation. Discrepancies in length of sessions resulted from length of tape used. Stenographic sessions were generally longer to fully utilize the stenographer.

The teacher asked 932 questions during the 453 minutes of recorded classroom activity and 655 questions during the 491 minutes of stenographically recorded classroom activity. During these same sessions, the students asked 655 and 619 questions respectively.

The total of 1587 questions asked by the teacher and the 1075 questions of the students were asked in 944 minutes of class time or at the rate of 2.83 questions per minute. The teacher outquestioned the students two questions to one during the recorded sessions but only slightly

TABLE I

DISTRIBUTION OF QUESTIONS ASKED BY THE TEACHER AND STUDENTS DURING FOURTEEN TIMED CLASSROOM SESSIONS

Session[1]	Teacher questions[2]	Student questions	Length of class session in minutes
R1	135	24	56
S1	73	39	57
R2	175	32	64
S2	154	83	79
R3	99	104	62
S3	84	195	77
R4	131	42	61
S4	157	60	68
R5	161	128	75
S5	57	80	65
R6	154	75	78
S6	49	71	73
R7	77	51	67
S7	81	81	72
TOTAL 14	1587	1075	944

[1]"R" indicates recorded sessions; "S" indicates stenographic sessions.

[2]Does not include acknowledging student by name.

exceeded their question asking during the stenographic sessions. In general, for every student question asked, the teacher asked half again as many per minute for the fifteen plus hours recorded.

During the fourteen sessions, the teacher asked one hundred or more questions on seven occasions, while on only three occasions did the students ask more than one hundred questions; and during one of these sessions, the teacher surpassed the students total of 128 questions. Four times during this study the teacher questioning total was exceeded by the class; however, one session was inconclusive with a difference of only five questions. The students averaged 34.6 questions per session, averaging 21.4 thought questions and 12.9 memory questions. Ten questions could not be classified.

These findings substantiate measures previously reported by Floyd (10), Stevens (17), and Suchman (19) and are not to be dwelled upon here. The importance of quality and not just quantity must be heeded and will be considered later in this chapter.

Conclusions.

1. The study indicated conclusively that the teacher, asking 60 percent of the questions, outquestioned the class during the fourteen sessions.

2. The teacher totals were decreased when the class was allowed to ask questions or work on their own.

3. The students tended to favor open-end assignments rather than the structured science lessons, or at least the number of questions asked indicated this tendency.

4. The teacher asked half again as many questions as did the students as a group.

Implications and recommendations. The results of this study indicated excessive control by the teacher in the classroom. The rate of question asking for this study averaged 177 questions per hour, or if maintained, would total 1062 questions in a six hour school day. This would be too much information to grasp in a day's time.

On the basis of the stated findings, teachers should attempt less question asking where possible; learn to formulate and ask a few quality questions each day; and give the students time in school to satisfy their inquisitiveness through question asking. Students may even learn more with less teacher talk and more question asking time for themselves.

B. WHAT DO THE COMPARATIVE ACHIEVEMENT AND QUESTION ASKING ABILITIES INDICATE?

Findings. What do the comparative achievement and question asking abilities indicate? Two groups were selected for particular study and comparison. The first group consisted of those students having achievement percentage scores above 90 percent but not below 80 percent in reading comprehension, problem solving, science, or social studies information. The second group consisted of those students having percentile scores in the 60's or lower on any of the four test areas. Nine students composed the high group and eleven students were ranked as the low group (note tables II and III). The middle group constituted the middle eleven students as rated by achievement percentiles.

The high group had 1 of its 332 questions left unclassified while the low group had 4 of the 421 questions asked by them unclassified. The lower group asked 39 percent of the total class questions while the high group asked 30 percent. The low group asked 36 percent of the class' thought questions and the high group questioned thoughtfully 34 percent of the 666 thought questions. The high group asked only 26 percent of the memory questions while the lower group asked 44 percent of the memory ques-

TABLE II

HIGH ACHIEVERS RANKED ACCORDING TO NUMBER OF QUESTIONS ASKED IN A FIFTH-SIXTH-GRADE CLASSROOM (THOSE HAVING 90 PERCENTILE BUT NOT LOWER THAN 80 PERCENTILE ACHIEVEMENT RATINGS)

Student	Achievement Percentiles				Total per student	Questions		
	Reading comprehension	Problem solving	Science	Social studies		Thought	Memory	Other
5F3	93	93	98	89	68	49	19	
6F5	96	88	99	96	47	26	20	1
6M5	94	97	97	99	46	39	7	
5M6	97	88	93	97	44	31	13	
5F5	98	96	98	99	33	24	9	
6M4	92	98	99	98	33	15	18	
6F4	98	80	92	93	27	21	6	
6M2	96	97	99	99	20	13	7	
6F7	98	96	99	99	14	9	5	
29% of class				Totals	332	227	104	1
				Based on total class questions	30%	34%	26%	10%
				Average questions per student	36.8	25.2	11.6	.11

NOTE: In charts where students were considered individually all names were coded as follows; first number indicates grade, the letter indicates male or female, and the last number indicates the child. The code agrees throughout the study and also appears in appendix A.

TABLE III

LOW ACHIEVERS RANKED ACCORDING TO NUMBER OF QUESTIONS ASKED IN A FIFTH-SIXTH-GRADE CLASSROOM (THOSE STUDENTS HAVING ANY ACHIEVEMENT PERCENTILE SCORE OF 69 OR LOWER)

Student	Achievement Percentiles				Total per student	Questions		
	Reading comprehension	Problem solving	Science	Social studies		Thought	Memory	Other
6M1	66	91	64	78	81	33	48	
5F6	82	64	84	87	61	42	19	
5M2	38	47	61	39	59	30	28	1
5M10	34	54	68	79	40	20	20	
6F2	84	83	54	64	39	24	14	1
6F8	87	86	61	84	30	18	12	
5M3	38	54	43	39	27	17	10	
5M4	80	36	87	89	26	18	7	1
6F1	90	68	54	64	26	20	5	1
6F3	69	68	92	71	19	13	6	
5M8	68	64	93	89	13	8	5	
35% of class				Totals	421	243	174	4
				Based on total class questions	39%	36%	44%	40%
				Average questions per student	38.2	22.1	15.8	.36

tions. The lower group's questions consisted of 70 percent thought questions while the high group had 68 percent thought questions.

The student asking the most thought questions was in the high group, however, this group had neither the largest or smallest amount of questions. Two students, in the high group, having the highest achievement percentiles asked the fewest questions in that group. The student asking the most questions was ranked in the low group. His 81 questions primarily resulted from his class high total of memory questions.

No mention has been made to this point relative to achievement and average number of questions asked by the two groups. Insignificant differences were indicated between the groups within this study.

Conclusions.

1. Students of the lower achievement percentile group tended to ask more memory questions than did the high group.

2. Students of the lower achievement group generally asked more questions of all kinds.

3. Better achieving students tended to ask fewer than the average number of questions asked by each member of the class.

4. Better achieving students tended to ask more thought questions than did middle and lower group achievers.

5. When compared, questioning averages and percentile differences were similar throughout the class.

6. The high, low, and average achievers generally asked near equal amounts of questions but high achievers tended to ask better questions more often.

Implications and recommendations. Since questions can come from any group of achievers, classroom patterns should be directed toward utilizing questioning in the classroom. Evidence indicates the need for teaching better question asking and not just memory of rote facts at all achievement levels.

C. HOW DOES QUESTIONING COMPARE WITH CERTAIN DEFINED INTELLIGENCE MEASURES?

Findings.[1] To answer this question, verbal I.Q. scores obtained from the Lorge Thorndike Intelligence Test were used. Each student was ranked from high to low score, the range being 142 to 101. When comparing these 31 scores with the number and types of questions asked by individual students, the following was found:

One individual, 6M4(1), had a low ratio of thought to total questions asked while student 5F1(25) asked a high amount of thought questions in comparison to questions asked, although she asked a small number of questions totally. A sixth-grade girl, 6F6(16), asked the fewest questions of anyone in the class. Her total of 7 was in complete contrast to the 81 questions asked by boy 6M1(11); however, the ratio of thought to total questions asked by these two was almost identical. One particular boy, 6M5(9), had the best ratio of thought questions to questions asked by students asking more than 30 questions. His 39 thought questions were 85 percent of his own total; however, he asked

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[1]Students were ranked according to their verbal I.Q. Numbers shown in parenthesis indicate students I.Q. rank within the class.

TABLE IV

VERBAL INTELLIGENCE RANK AND NUMBER OF TOTAL QUESTIONS AND THOUGHT QUESTIONS ASKED BY A FIFTH-SIXTH-GRADE CLASS

Student	Verbal I.Q.	Total questions	Thought questions	Student	Verbal I.Q.	Total questions	Thought questions
6M4	142	33	15	5F7	122	16	10
6F5	141	47	26	5M9	122	30	15
5F2	139	22	15	5F3	120	68	49
6F7	137	14	9	5M1	119	46	32
5M6	136	44	31	5M7	119	56	32
6M2	136	20	13	5F6	118	61	42
5F4	126	41	21	5M4	118	26	18
6F2	125	39	24	5M2	117	59	30
6M5	125	46	39	5F1	116	11	9
5M8	125	13	8	5M10	113	40	20
6M1	124	81	33	5M3	113	27	17
6F8	124	30	18	6F3	112	19	13
5M5	124	43	25	6F9	110	10	7
6F4	123	20	13	5F5	110	33	24
6F1	122	26	20	6M3	101	40	27
6F6	122	7	3				

only 4 percent of the total questions coming from the class.

Many similarities were found in the rankings (note table IV). Girls 6F3(28) and 5F5(30) had similar quality to quantity ratios. Boys 5M10(26) and 5M3(26) both had practically the same ratio of quality to quantity. Moreover, students 5F3(19), 5M1(20), 5F6(22), and 5M4(23) had thought question to total question percentages of 72-69 percent, the latter three all asking 69 percent thought questions. Two students, 6M2(6) and 6F4(14), each asked 20 questions of which both had 13 thought questions.

Some extreme variations were also evident. The group of 6M5(9), 5M8(10), and 6M1(11) had near identical I.Q. scores but asked 46, 13, and 81 questions respectively. One of the group, 6M5, asked 85 percent thought questions followed by student 5M8 with a percentage of 61 and student 6M1 with 41 percent. One particular girl, 6F5(2) and boy, 6M3(31) had similar patterns of thought to total questions asked. Boys 5M6(5) and 5M1(20) asked a similar number of questions and near the same number of thought questions. The relative position of girls to boys appeared insignificant here and will be more closely looked at in section G of these findings.

Conclusions.

1. Students falling in the middle portions of

the I.Q. rankings tended to follow similar quantity-quality patterns.

2. Thought questions were asked equally from high and low I.Q. ranked students.

3. There was a tendency for lower I.Q. students to have more difficulty formulating questions than for students with higher I.Q.'s.

4. I.Q. does not significantly govern the number of questions asked by students of a fifth-sixth-grade class.

5. Some indications were shown that students with higher I.Q. ask better quality questions than do students of lower I.Q.

6. The middle third of the students ranked by I.Q. scores asked nearly 100 fewer questions than did the top and bottom third of the group.

Implications and recommendations. Additional studies concerning the relationship between I.Q. and question asking should be undertaken in the future. This study, using intelligence as only one measure, found inconclusive evidence for or against the more intelligent student asking more questions. There were slight indications that the more intelligently rated students asked more and better thought questions, but this was inconsistent in the study.

The study also indicates possible use of questioning with a wide range of intelligence ratings without undue differences. In this study, the students in the upper and lower half of the I.Q. ratings asked about the same number of thought questions indicating possible utilization of question asking with entire class groups. No one factor, specifically intelligence, should be the only consideration when rating questions asked during classroom activity. Further, the number of questions asked far overshadows the quality of the questions indicating that training students to question might be of priority in our school programs.

D. HOW MIGHT INDIVIDUAL SOCIAL STIMULUS VALUES AFFECT QUANTITY AND QUALITY OF ORAL QUESTIONING?

Findings. The study here indicates the relative position of the fifteen students asking the most questions equally distributed throughout the social rankings. An example of this was shown when student 6M1, who had asked the most questions during the study, was ranked twenty-seventh on the sociometric scale. Further, girl 6F6 asked the fewest questions but was ranked first of the 31 students.

Twelve girls and four boys composed the top half of the sociometric ratings and asked 46 percent of the total questions and 48 percent of the thought questions. Eleven boys and four girls made up the lower half on the sociometric rating; however, they asked 54 percent of the total questions including 52 percent of the total group's thought questions.

The top six students were ranked higher sociometrically than they were on number of questions asked while the bottom nine sociometrically all had better questioning rank. Only one boy, 5M6, was ranked in the top ten of the sociometric group. He, 5M6, was ranked fifth on the sociometric scale and ninth on the questions scale. Students 6F5, 5M6, and 5F6 were in the top ten both socially and on questioning

TABLE V

SOCIOMETRIC RANKINGS AND NUMBERS OF QUESTIONS ASKED BY A FIFTH-SIXTH-GRADE CLASS

Student	Total points	Total questions	Question rank	Thought questions	Student	Total points	Total questions	Question rank	Thought questions
6F6	113	7	31	3	6M4	15	33	15	15
6F7	94	14	27	9	6M5	12	46	7	39
6F5	75	47	6	26	5F3	1	68	2	49
6F8	74	30	17	18	6M3	-16	40	12	27
5M6	62	44	9	31	6F9	-19	10	30	7
6F2	48	39	14	24	5M8	-21	13	28	8
5F6	45	61	3	42	5M7	-24	56	5	32
5F7	40	16	26	10	5M2	-26	59	4	30
6F4	39	27	19	21	6F1	-33	26	21	20
5F5	35	33	15	24	5F2	-46	22	23	15
5M1	34	46	7	32	6M1	-77	81	1	33
5F4	29	41	11	21	5M4	-78	26	21	18
6M2	22	20	24	13	5M9	-88	30	17	15
6F3	19	19	25	13	5M3	-177	27	19	17
5F1	18	11	29	9	5M10	-198	40	12	20
5M5	17	43	10	25					
Total questions		498		321	Total questions		577		345
Percentage of total		46%		48%	Percentage of total		54%		52%

rank. Another individual, 5F4, came close to matching her exact rank position being twelfth on the sociometric scale and eleventh on the questioning scale, but her ranks were not within the top ten. Student 6M4 also showed similar rankings in both categories being seventeenth sociometrically and fifteenth in oral questioning during the study. Fifth-graders 5F2 and 5M8 were the only students found in the lower portion of the rankings both times. Fourteen of the thirty-one students were ranked higher socially than they were by the number of questions they asked.

Conclusions.

1. Most students, regardless of social position, want to ask questions.

2. Students, generally more quiet in class, were ranked higher socially by the class of fifth-sixth graders.

3. The more adept thought questioners in the class composed the middle of the sociometric group.

4. Boys made-up the major portion of the bottom sociometric rankings.

5. Less socially inclined students asked more questions during this study.

6. Proportionally, the best thought questioner was ranked in the lower part of the class.

7. The majority of the students ranked higher socially than they did on the number of questions they asked.

Implications and recommendations. Students on the lower end of the sociometric ranking tended to ask more questions indicating desire for information or attention. Their questions consisted of information seeking and clarification types of questions. Overall, the evidence in this portion of the study indicates the sociometric factor may not be conclusive as an indicator of questioning ability; however, these measures show questioning serves the less socially oriented students by giving them an opportunity to participate. In this light, teachers must direct questioning to all students in class and should allow all students within the classroom the privilege of inquiring.

E. WHAT RELATIONSHIPS CAN BE MADE BETWEEN PERSONALITY MEASURES AND QUESTION ASKING?

Findings.[2] When the students had been ranked according to their personality test scores only student 6M5 ranked high in the three areas considered below. His personality (2), total questions asked (7), and the rank of thought questions (3) was higher than any other student. One individual, 6F7(1), was twenty-seventh in both question asking and number of thought questions. At the opposite end another student, 5M9(31), was seventeenth on questioning and twenty-first on asking thought questions.

Several students, 6F5(10), 6M3(10), 5M5(12), 6F2(13), 5F5(13), 5F2(19), and 5F7(27), indicated some consistency of rank in the areas of personality, questions asked, and rank of thought questions. The same group, along with 6M5(2) and 6M4(24), had thought question ranks which were within three ranks of their individual personality.

Six of the top eight thought questioners were in the lower personality group; however, of the next eight, six were found in the upper personality rankings. Only seven students showed a direct relationship with personality and

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[2]Students were ranked according to their personality score. Numbers in parentheses indicate students rank within the class.

TABLE VI

THE PERSONALITY RANKS AND NUMBER AND TYPES OF QUESTIONS ASKED BY 31 FIFTH-SIXTH-GRADE STUDENTS

Student	Total	Questions Rank	Thought total	Rank	Student	Total	Questions Rank	Thought total	Rank
6F7	14	27	9	27	5M2	59	4	30	8
6M5	46	7	39	3	5M6	44	9	31	7
6F1	26	21	20	16	5F4	41	11	21	14
6M2	20	24	13	24	5F2	22	23	15	21
6F8	30	17	18	18	6F9	10	30	7	30
6F6	7	31	3	31	5F6	61	3	42	2
5M4	26	21	18	18	6M1	81	1	33	4
6F3	19	25	13	24	6M4	33	15	15	21
5F1	11	29	9	27	6F4	27	19	21	14
6F5	47	6	26	10	5M7	56	5	32	5
6M3	40	12	27	9	5F7	16	26	10	26
5M5	43	10	25	11	5F3	68	2	49	1
6F2	39	14	24	12	5M3	27	19	17	20
5F5	33	15	24	12	5M10	40	12	20	16
5M1	46	7	32	5	5M9	30	17	15	21
5M8	13	28	8	29					

the number of questions asked. The last six students in personality ranking were also found to be low in "school relations" on the personality test results.

Conclusions.

1. There does not seem to be any consistency with personality and number and types of questions asked by fifth-sixth-grade students.

2. Personality may have something to do with the number of thought questions asked by fifth-sixth-grade students.

3. There was a direct relationship between thought questions and number of questions asked, except for individual 6M4.

Implications and recommendations. Few significant relationships appeared allowing comparisons. Those students not liking school tended to score low on the personality test but the factor of questioning could not be attributed to personality here. Further investigation of a larger sampling may indicate the same results. Under the conditions of this study, no significant relationship was found between personality and question asking in the classroom. There did not appear to be any one factor consistent with a major portion of the class studied.

F. DO THE CHRONOLOGICAL AGES OF STUDENTS AFFECT QUESTIONING WITHIN THEIR INDIVIDUAL CLASS GROUP?

Findings.[3] Ages for the findings were computed on the basis of the students age as of September 1, 1966. Ages were rounded to the nearest month. The average age of the group was ten years eight months. The middle age was ten years eleven months. The oldest was eleven years eleven months and the youngest, some two years one month younger, was nine years ten months. The boys averaged ten years six months; while the girls averaged eleven years of age.

Student 6M1(7) asked the most total questions and was ranked fourth in thought questions. Individual 6F6(1) was ranked thirty-first in both total questions and thought questions while being one of the four oldest students. The six oldest students were ranked between seventeenth and thirty-first in question asking. The five youngest students were ranked between twelfth and twenty-first in question asking. Three of the four fifth graders, who were older than the youngest sixth grader, were ranked high in total question asking.

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[3]Numbers immediately following student names are age rank within the class.

TABLE VII

AGE, TOTAL QUESTIONS, AND THOUGHT QUESTIONS SHOWN BY RANK OF A FIFTH-SIXTH-GRADE CLASS

Student	Age	Questions asked rank	Thought question rank	Student	Age	Questions asked rank	Thought question rank
6F7	11.11	27	27	5F7	10.10	26	26
6F4	11.11	19	14	6M2	10.9	24	24
6F1	11.11	21	16	5M7	10.6	5	5
6F6	11.11	31	31	5F2	10.6	23	21
6F3	11.10	25	24	5M6	10.6	9	7
6F8	11.8	17	18	5M8	10.3	28	29
6M1	11.5	1	4	5F1	10.3	29	27
6M4	11.4	15	21	5F4	10.3	11	14
6M5	11.3	7	3	5M2	10.2	4	8
6F2	11.2	14	12	5F6	10.1	3	2
6M3	11.2	12	9	5F5	10.1	15	12
6F5	11.0	6	10	5M4	10.0	21	18
5M1	10.11	7	5	5M10	10.0	12	16
5F3	10.11	2	1	5M9	10.0	17	21
5M5	10.11	10	11	5M3	9.10	19	20
6F9	10.10	30	30				

Conclusions.

1. Older students tended to ask the least questions, seldom surpassing the average number of questions asked by all the students.

2. The average aged students of the group asked more questions and generally more thought questions than did the older and younger students.

3. Younger students asked average or above average numbers of questions.

4. Older students asked better thought questions proportionate to the total number of questions asked by them.

Implications and recommendations. In this group age did not seem a factor for asking questions. Average aged students were predominant in asking questions although older students usually asked better thought questions. A strong indication here was that the fringes of the group were somewhat ignored. Additional effort might well be made by classroom teachers to include the entire group in questioning activities.

G. WHO ASKS MORE AND BETTER QUESTIONS, THE BOYS OR THE GIRLS?

Findings. The fifteen boys outquestioned the sixteen girls during the duration of this study. The boys asked 604 questions while the girls asked 471. Their total of 604 questions was 56 percent of all the questions asked. Likewise, the sixth-grade boys exceeded the sixth-grade girls totals 220-219 despite being outnumbered five to nine. The ten fifth-grade boys asked more questions than did the seven fifth-grade girls, 384-252. The top five question askers from each sex were used in a further comparison. The top five boys asked 288 questions while the five girls were asking 256.

The boys of the class responded with 53 percent of all the thought questions as compared to the 47 percent total by the girls. The 355 thought questions asked by the boys was 33 percent of all the questions. The girls' 311 thought questions represented 29 percent of all questions asked during the fourteen sessions.

Twenty-three percent of all the questions asked came from the boys in the form of 244 memory questions. The girls' 155 memory questions equalled 14 percent of the total 1075 questions. About 1 percent of the questions were classed as "other." A more detailed analysis of the memory

TABLE VIII

A COMPARISON OF THE NUMBER OF QUESTIONS ASKED BY BOYS OR GIRLS OF A FIFTH-SIXTH-GRADE CLASS

Girls	Total questions	Thought questions	Memory questions	Question rank
6F1	26	20	5	21
6F2	39	24	14	14
6F3	19	13	6	25
6F4	27	21	6	19
6F5	47	26	20	6
6F6	7	3	4	31
6F7	14	9	5	27
6F8	30	18	12	17
6F9	10	7	3	30
	219	141	75	
5F1	11	9	2	29
5F2	22	15	6	23
5F3	68	49	19	2
5F4	41	21	19	11
5F5	33	24	9	15
5F6	61	42	19	3
5F7	16	10	6	26
	252	170	80	
Totals	471	311	155	
Percentage	44%	47%	39%	
Percentage of total		29%	14%	

Boys	Total questions	Thought questions	Memory questions	Question rank
6M1	81	33	48	1
6M2	20	13	7	24
6M3	40	27	12	12
6M4	33	15	18	15
6M5	46	39	7	7
	220	127	92	
5M1	46	32	13	7
5M2	59	30	28	4
5M3	27	17	10	19
5M4	26	18	7	21
5M5	43	25	18	10
5M6	44	31	13	9
5M7	56	32	23	5
5M8	13	8	5	28
5M9	30	15	15	17
5M10	40	20	20	12
	384	228	152	
	604	355	244	
	56%	53%	61%	
		33%	23%	

questions indicated 61 percent of the questions asked by the boys. The girls asked only 39 percent of the memory questions.

Conclusions.

1. Boys exceeded the girls in both areas, percentages and total questions asked by the class.

2. The boys in asking more questions did not formulate their questions accurately.

3. Boys tended to use memory questions more frequently than did the girls.

4. Proportionately, the girls asked more thought questions than did the boys.

5. The girls asked 12 percent fewer total questions but only 4 percent fewer thought questions than did the boys.

6. The girls' 155 memory questions represented 9 percent less memory questions than the boys asked.

Implications and recommendations. Boys ask more questions than do girls. Girls, however, tend to ask better quality questions more consistently than do boys. As indicated in table VIII, certain students asked more thought questions than did others. The boys asked more analytical and imagination questions and probably responded more

regularly than did the girls (note appendix A).

Further studies into boys versus girls in oral questioning will certainly answer many questions beyond this study. No attempt has been made here to consider the teacher, classroom activity, days each student was absent or days present, nor has a sampling been taken from another school area. Recommendations for such a study would be highly encouraged.

SUMMARY

This paper presents a comparative study between achievement, I.Q., personality, social measures, age, and sex and the number and types of questions asked by a fifth-sixth-grade class. The research was designed to measure each of the above and rank them for comparative purposes. The compiling of information was carried out through a series of fourteen recorded and stenographic sessions. Evaluations and recommendations of the research included suggestions for additional research.

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APPENDIX

APPENDIX A

1. Achievement scores were from the Metropolitan Achievement Test.

2. I.Q. was taken from Lorge Thorndike Intelligence Scores.

3. Personality ranks were established by scores from the California Test of Personality--Elementary, Form A.

4. Sociometric ranks were determined by test results from tests made by the researcher and district psychologist as shown in appendix D.

5. Age and sex were taken from student folders.

Subject Areas Recorded During the Fourteen Sessions

R1 - Science
S1 - Social Studies and Vocal Music
R2 - Science
S2 - English and Social Studies
R3 - Science (work period)
S3 - Spelling and Creative Writing (inquiry)
R4 - Science and reading pen pal letters aloud
S4 - Math and English
R5 - Science and Spelling (work period)
S5 - Social Studies (committee report) and English
R6 - Science and Spelling (work period)
S6 - Social Studies and Penmanship (inquiry)
R7 - Science (inquiry)
S7 - Social Studies (inquiry)

Questions were classified using the classification shown in appendix B. Individual student questions for the fourteen sessions are as follows:

STUDENT		RECORDED 1	STENO 1	RECORDED 2	STENO 2	RECORDED 3	STENO 3	RECORDED 4	STENO 4	RECORDED 5	STENO 5	RECORDED 6	STENO 6	RECORDED 7	STENO 7	TOTAL QUESTIONS	AGE	VERBAL I.Q.	NON-VERBAL I.Q.	READING COMP.	PROBLEM SOLV.	SCIENCE	SOC. STUDIES	PERSONALITY	SOCIOMETRIC
6F1	QUESTIONS		1		1	1	10		3	7	3					26	11.11	122	121	90	68	54	64	3	25
	THOUGHT				1		10		3	4	2					20									
	MEMORY					1				3	1					5									
	OTHER		1													1									
6F2	QUESTIONS	1	1		7	7	5	2		9	4		A	2	1	39	11.2	125	110	84	83	54	64	13	6
	THOUGHT	1	1		4	5	3	1		6	1			2		24									
	MEMORY				3	2	1	1		3	3				1	14									
	OTHER						1									1									
6F3	QUESTIONS					1	5		2	1	1	3	1	5		19	11.10	112	101	69	68	92	71	8	14
	THOUGHT						3		1	1		2	1	5		13									
	MEMORY					1	2		1		1	1				6									
	OTHER																								
6F4	QUESTIONS					3	6	1	1	2	1		6	2	5	27	11.11	123	120	98	80	92	93	24	9
	THOUGHT					1	6	1	1	2	1		3	2	4	21									
	MEMORY					2							3		1	6									
	OTHER																								
6F5	QUESTIONS	2	4		2	4	5	2	3	10	3	4	3		5	47	11.0	141	122	96	88	99	96	10	3
	THOUGHT	1	1		1	2	1	1	3	6	3	1	1		5	26									
	MEMORY	1	3		1	2	4	1		3		3	2			20									
	OTHER									1						1									

STUDENT		RECORDED 1	STENO 1	RECORDED 2	STENO 2	RECORDED 3	STENO 3	RECORDED 4	STENO 4	RECORDED 5	STENO 5	RECORDED 6	STENO 6	RECORDED 7	STENO 7	TOTAL QUESTIONS	AGE	VERBAL I.Q.	NON-VERBAL I.Q.	READING COMP.	PROBLEM SOLV.	SCIENCE	SOC. STUDIES	PERSONALITY	SOCIOMETRIC
6F6	QUESTIONS						1				2		2		2	7	11.11	122	114	87	91	84	89	5	1
	THOUGHT						1				1				1	3									
	MEMORY										1		2		1	4									
	OTHER																								
6F7	QUESTIONS				1	3	3	1	4	A	A		2			14	11.11	137	129	98	96	99	99	1	2
	THOUGHT				1	1	2	1	3				1			9									
	MEMORY					2	1		1				1			5									
	OTHER																								
6F8	QUESTIONS	1	1		1	2	3	1		3	10		3	3	2	30	11.8	124	105	87	86	61	84	5	4
	THOUGHT		1			2		1		1	7		2	3	1	18									
	MEMORY	1			1		3			2	3		1		1	12									
	OTHER																								
6F9	QUESTIONS		2	1			3				1			1	2	10	10.10	110	111	90	91	81	89	21	21
	THOUGHT						3				1			1	2	7									
	MEMORY		2	1												3									
	OTHER																								
6M1	QUESTIONS	3	1	2	9	16	18	4	3	3	8		4	2	8	81	11.5	124	113	66	91	64	78	23	27
	THOUGHT				6	6	11	2		2	3		2		1	33									
	MEMORY	3	1	2	3	10	7	2	3	1	5		2	2	7	48									
	OTHER																								

STUDENT		RECORDED 1	STENO 1	RECORDED 2	STENO 2	RECORDED 3	STENO 3	RECORDED 4	STENO 4	RECORDED 5	STENO 5	RECORDED 6	STENO 6	RECORDED 7	STENO 7	TOTAL QUESTIONS	AGE	VERBAL I.Q.	NON-VERBAL I.Q.	READING COMP.	PROBLEM SOLV.	SCIENCE	SOC. STUDIES	PERSONALITY	SOCIOMETRIC
6M2	QUESTIONS	1	1		1		4	3		2	4	1			3	20	10.9	134	115	96	97	99	99	4	13
	THOUGHT	1					3	3		1	2	1			2	13									
	MEMORY		1		1		1			1	2				1	7									
	OTHER																								
6M3	QUESTIONS	1			2	A	8	7	3	5	2	5	2	5		40	11.2	101	106	90	43	93	93	10	20
	THOUGHT	1			1		5	5	3	1	2	3	1	5		27									
	MEMORY				1		3	2		4		1	1			12									
	OTHER											1				1									
6M4	QUESTIONS	3		1		3	5			4	5	2	4	6		33	11.4	142	136	92	98	99	98	24	17
	THOUGHT	1					4			1			3	6		15									
	MEMORY	2		1		3	1			3	5	2	1			18									
	OTHER																								
6M5	QUESTIONS	1		1	2	3	4	1		4	2	14		3	11	46	11.3	125	115	94	97	97	99	2	18
	THOUGHT	1		1		3	4	1		2	1	12		3	11	39									
	MEMORY				2					2	1	2				7									
	OTHER																								
5F1	QUESTIONS		1			A	1		3	3		2	A		1	11	10.3	116	107	70	85	78	76	8	15
	THOUGHT		1				1		3	1		2			1	9									
	MEMORY									2						2									
	OTHER																								

STUDENT		RECORDED 1	STENO 1	RECORDED 2	STENO 2	RECORDED 3	STENO 3	RECORDED 4	STENO 4	RECORDED 5	STENO 5	RECORDED 6	STENO 6	RECORDED 7	STENO 7	TOTAL QUESTIONS	AGE	VERBAL I.Q.	NON-VERBAL I.Q.	READING COMP.	PROBLEM SOLV.	SCIENCE	SOC. STUDIES	PERSONALITY	SOCIOMETRIC
5F2	QUESTIONS		5			2	5		2	3	1	1		2	1	22	10.6	139	115	77	88	98	72	19	26
	THOUGHT		3			1	5		1	1	1			2	1	15									
	MEMORY		1			1			1	2		1				6									
	OTHER		1													1									
5F3	QUESTIONS	2	4	4	3	2	11	2	4	12	3	2	10	3	6	68	10.11	120	126	93	93	98	89	27	19
	THOUGHT	1	3	4	2	1	8		4	7	2		10	2	5	49									
	MEMORY	1	1		1	1	3	2		5	1	2		1	1	19									
	OTHER																								
5F4	QUESTIONS		2		3	7	7	2	2	7	2		2		7	41	10.3	126	116	88	72	93	76	19	12
	THOUGHT				1	3	6	1	1	2	2		1		4	21									
	MEMORY		2		2	3	1	1	1	5			1		3	19									
	OTHER					1										1									
5F5	QUESTIONS	2	4	1			6	1	2	1	4	1	7		4	33	10.1	110	111	98	96	98	99	13	10
	THOUGHT	1	1	1			4	1	2		3		7		4	24									
	MEMORY	1	3				2			1	1	1				9									
	OTHER																								
5F6	QUESTIONS	1	1	2	7	1	19	2	7	5	3	1	3	6	3	61	10.1	118	112	82	64	84	87	22	7
	THOUGHT		1	1	4		18	2	4	3	2			5	2	42									
	MEMORY	1		1	3	1	1		3	2	1	1	3	1	1	19									
	OTHER																								

STUDENT		RECORDED 1	STENO 1	RECORDED 2	STENO 2	RECORDED 3	STENO 3	RECORDED 4	STENO 4	RECORDED 5	STENO 5	RECORDED 6	STENO 6	RECORDED 7	STENO 7	TOTAL QUESTIONS	AGE	VERBAL I.Q.	NON-VERBAL I.Q.	READING COMP.	PROBLEM SOLV.	SCIENCE	SOC. STUDIES	PERSONALITY	SOCIOMETRIC
5F7	QUESTIONS	1	1		5	1	4		2	1					1	16	10.10	122	121	93	88	81	76	27	8
	THOUGHT	1	1		3	1	3		1							10									
	MEMORY				2		1		1	1					1	6									
	OTHER																								
5M1	QUESTIONS	1	1	3	9	2	4	3	2	5	3	3	3	6	1	46	10.11	119	117	95	72	91	87	15	11
	THOUGHT	1	1	1	6		3	3		3	3	2	3	5	1	32									
	MEMORY			2	3	1	1		2	2		1		1		13									
	OTHER					1										1									
5M2	QUESTIONS	1	7	2	2	8	A	2	4	15	2	6	5		5	59	10.2	117	117	38	47	61	39	17	24
	THOUGHT		3	2	2	4		2	2	7	1	3	3		1	30									
	MEMORY	1	4			4			2	7	1	3	2		4	28									
	OTHER									1						1									
5M3	QUESTIONS			1	1	1	15		1	2	4				2	27	9.10	113	101	38	54	43	39	29	30
	THOUGHT			1		1	10		1	2					2	17									
	MEMORY				1		5				4					10									
	OTHER																								
5M4	QUESTIONS		1	1	2	5	A			4	2	2	4	2	3	26	10.0	118	120	80	36	87	89	5	28
	THOUGHT		1	1	1	3				3	1	1	3	2	2	18									
	MEMORY				1	2				1	1		1		1	7									
	OTHER											1				1									

STUDENT		RECORDED 1	STENO 1	RECORDED 2	STENO 2	RECORDED 3	STENO 3	RECORDED 4	STENO 4	RECORDED 5	STENO 5	RECORDED 6	STENO 6	RECORDED 7	STENO 7	TOTAL QUESTIONS	AGE	VERBAL I.Q.	NON-VERBAL I.Q.	READING COMP.	PROBLEM SOLV.	SCIENCE	SOC. STUDIES	PERSONALITY	SOCIOMETRIC
5M5	QUESTIONS		4	1	1		2	6	2	7	3	11	4		2	43	10.11	124	128	80	90	94	97	12	16
	THOUGHT		1	1	1		2	5	1	4	2	3	3		2	25									
	MEMORY		3					1	1	3	1	8	1			18									
	OTHER																								
5M6	QUESTIONS	1		3	4	5	15		2	6	1	4	1	2		44	10.6	136	113	97	88	93	97	17	5
	THOUGHT			2	3	2	11		2	5	1	3		2		31									
	MEMORY	1		1	1	3	4			1		1	1			13									
	OTHER																								
5M7	QUESTIONS		3	6	15	6	10	2	1	1	1	8	1	1	1	56	10.6	119	121	86	76	91	82	26	23
	THOUGHT		3	4	6	2	6	2	1			7		1		32									
	MEMORY			2	9	3	4			1	1	1	1		1	23									
	OTHER					1										1									
5M8	QUESTIONS		2		1	2	2		1	2		2	1			13	10.3	125	126	88	64	93	89	16	22
	THOUGHT		2		1		2					2	1			8									
	MEMORY					2			1	2						5									
	OTHER																								
5M9	QUESTIONS	1			1	2	10		4	1	3	3			5	30	10.0	122	115	95	85	97	87	31	29
	THOUGHT				1		6		2		1				5	15									
	MEMORY	1				2	4		2	1	2	3				15									
	OTHER																								

STUDENT	RECORDED 1	STENO 1	RECORDED 2	STENO 2	RECORDED 3	STENO 3	RECORDED 4	STENO 4	RECORDED 5	STENO 5	RECORDED 6	STENO 6	RECORDED 7	STENO 7	TOTAL QUESTIONS	AGE	VERBAL I.Q.	NON-VERBAL I.Q.	READING COMP.	PROBLEM SOLV.	SCIENCE	SOC. STUDIES	PERSONALITY	SOCIOMETRIC
5M10 QUESTIONS	1	2	3	3	17	4		2	3	2		3			40	10.0	113	93	34	54	68	79	30	31
THOUGHT		1			12	1		1	3	1		1			20									
MEMORY	1	1	3	3	5	3		1		1		2			20									
OTHER																								

Additional information:

Symbol "A" indicates absence.

Total questions by teacher - 1587
Total questions by students- 1075
  Thought 666 (62%) or 21.4 average per student
  Memory 399 (37%) or 12.9 average per student
  Other 10 (1%) or .32 average per student
Average questions per student - 34.6

Age -- based on September 1, 1966
I.Q. -- actual scores, not percentiles
Achievement -- scores indicated in percentiles
Personality -- rank score in class
Sociometric -- rank score in class

Gatto Classification System as revised by Floyd and kept uppermost in mind during classification of all questions.

THOUGHT

Logic

Reasoned and reasoning

Mental activity that is active and conscious

Organized
- beyond recall
- imagination
- insight
- analysis
- interpretation
- causal reasoning
- comparisons
- criticisms
- evaluation
- clarification

MEMORY

Recall without any or much conscious effort

Reacting emotionally
- strong feeling
- impulse toward open action
- fear
- anger
- disgust
- grief
- joy
- surprise

Retained so probably previously taught

OTHER

(Identified only as a general category)

June 2, 1967
Normandy Park Elementary

Dear Parents,

In conjunction with work related to the Masters thesis, I would like permission to administer a group personality test to this year's class. The test will indicate a profile of personal and social adjustment as related to youngsters of this age group. The results will be completely statistical and will remain confidential. No reference will be made in the study to students by name. The test will be a standardized test, "California Test of Personality--Elementary, Form A."

I would greatly appreciate your consent allowing your child's participation. If there are any questions, please feel free to call the school office. Sign and return this form indicating your child's participation.

Thank you,

Mr. Call
Mr. Driver, Principal

. . . . . .

☐ I will allow my child to participate.

Signed_____

Date_____

SOCIOMETRIC TEST FOR THESIS WORK

DATE ADMINISTERED_____

TIME ADMINISTERED_____

Your full name?

What is your telephone number?

Name the three people you are most friendly with in this room.

Name the three people you are least friendly with in this room.

List the three people in this room you would most like to study with.

List the three people in this room you would least like to study with.

Name the three people in this room you would most like to sit with.

Name the three people in this room you would least like to sit with.

Which three people in the room would you most like to play with?

Which three people in the room would you least like to play with?

DIRECTIONS:

List only persons in this room (do not include the teacher).
Make your selections as truthful as possible.
Do not discuss your selections with others.
Be sure to place three names under each question.

SCORING:

Positive 1st choice	+3pts
Positive 2nd choice	+2pts
Positive 3rd choice	+1 pt
Negative 1st choice	-3pts
Negative 2nd choice	-2pts
Negative 3rd choice	-1 pt

Add positive points and subtract the negative points to attain the total for the individual student.