

Spring 1996

The Impact of Total Quality Management on Student Achievement and School Improvement Team Performance in an Urban Elementary Setting

Jennette Ann Straus
Old Dominion University

Follow this and additional works at: https://digitalcommons.odu.edu/urbanservices_education_etds

 Part of the [Elementary Education Commons](#), and the [Urban Education Commons](#)

Recommended Citation

Straus, Jennette A.. "The Impact of Total Quality Management on Student Achievement and School Improvement Team Performance in an Urban Elementary Setting" (1996). Doctor of Philosophy (PhD), dissertation, , Old Dominion University, DOI: 10.25777/mdfk-8d13
https://digitalcommons.odu.edu/urbanservices_education_etds/44

This Dissertation is brought to you for free and open access by the College of Education & Professional Studies (Darden) at ODU Digital Commons. It has been accepted for inclusion in Theses and Dissertations in Urban Services - Urban Education by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

THE IMPACT OF TOTAL QUALITY MANAGEMENT ON STUDENT
ACHIEVEMENT AND SCHOOL IMPROVEMENT TEAM PERFORMANCE IN
AN URBAN ELEMENTARY SETTING

by

Jeannette Ann Straus
B.S. June 1972, Old Dominion University
M.S. December 1989, The George Washington University

A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

URBAN SERVICES

OLD DOMINION UNIVERSITY
February 1996

Approved By:

Petra E. Snowden, Ph.D.
Dissertation Chair

Edward Neukrug, Ed.D.
Member

Rebecca S. Bowers, Ed.D.
Concentration Area Director

Benjamin I. Troutman, Ed.D.
Member

Gonna B. Evans, Ph.D., Dean of
Darden College of Education

ABSTRACT

THE IMPACT OF TOTAL QUALITY MANAGEMENT ON STUDENT ACHIEVEMENT AND SCHOOL IMPROVEMENT TEAM PERFORMANCE IN AN URBAN ELEMENTARY SETTING.

Jeannette Ann Straus
Old Dominion University, 1996
Director: Dr. Rebecca S. Bowers

The purpose of this study was to examine the relationship between TQM and student achievement, and TQM and faculty scores on the High PERFORMing Team Survey.

Currently, there exists no research which indicates that TQM can solve the problems of the urban schools. TQM is recommended by experts when the staff is highly educated, when management supports TQM, when team leaders can run meetings effectively, and when the organization can afford lost time and productivity while its team learns necessary skills.

The TQM schools used in this study began the transition to TQM in 1991. Reading comprehension and mathematics scores of the TQM schools were compared to non-TQM schools using a MANOVA. Mathematics scores were significantly improved. A MANOVA was also used to compare the seven areas of the High PERFORMing Team survey from the TQM schools with non-TQM schools. While there was an overall significant difference favoring TQM, none of the seven individual areas was significantly different.

A description of practice of TQM in each of the five urban elementary schools is included. The School Improvement Teams of the TQM schools were asked pertinent questions concerning the practice of TQM on site. The ongoing need for training staff in the proper use of TQM tools, providing release time for teacher involvement and focusing on instructional improvement are important for continued success in the use of TQM.

Chair of Advisory Committee: Dr. Petra E. Snowden

ACKNOWLEDGEMENTS

"The right time for attention to final outcomes in any production process--including the learning process--is at every step along the way" (Deming, 1993, October). I would like to extend my gratitude to Dr. Petra E. Snowden for encouraging and directing me at every step. My gratitude is also extended to Dr. Ben Troutman and Dr. Ed Neukrug for their contributions toward my completion of this study.

The individual teachers, administrators, and parents in both the Chesapeake and Portsmouth school systems, without whose cooperation this study would have been impossible, deserve my acknowledgement and my sincere gratitude. Mr. Claude Parent, Dr. Robert Cowden, Nadine Scott, Martha Lowery, and Diane Holland were a few of the key individuals who must be recognized for their contributions.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
OVERVIEW	1
PURPOSE	7
HYPOTHESES	9
DESIGN	9
SIGNIFICANCE OF THE STUDY	10
LIMITATIONS	11
DEFINITION OF TERMS	14
II. REVIEW OF THE LITERATURE	17
INTRODUCTION	17
PARTICIPATORY TEAM MANAGEMENT	19
TOTAL QUALITY MANAGEMENT	21
PREVIOUS RESEARCH	23
TRAINING	31
SUMMARY	36
III. METHOD	39
RESEARCH DESIGN	39
ASSESSMENT OF STUDENT ACHIEVEMENT: TQM	40
SAMPLE SELECTION OF STUDENTS	40
STATISTICAL ANALYSIS	42
ASSESSMENT INSTRUMENT: THE IOWA TEST OF BASIC SKILLS INSTRUMENT	43
ASSESSMENT OF TEACHERS: TQM	45
SAMPLE DESCRIPTION	45
STATISTICAL ANALYSIS	46
ASSESSMENT INSTRUMENT: THE HIGH PERFORMING TEAM SURVEY	47
RELIABILITY	48
SURVEY OF THE TEACHERS	52
TQM TRAINING AND IMPLEMENTATION PROCESS	53
PORTSMOUTH SCHOOLS' CHARACTERISTICS	59
CHESAPEAKE SCHOOLS' CHARACTERISTICS	61
SUMMARY OF SCHOOL CHARACTERISTICS	62
IV. RESULTS	65
RESULTS PERTAINING TO HYPOTHESIS ONE	65
RESULTS PERTAINING TO HYPOTHESIS TWO	74
DESCRIPTIVE COMPONENT	75

SCHOOL IMPROVEMENT TEAM MEETINGS AND ARTIFACT REVIEWS	81
SCHOOL ONE MEETING REVIEW	81
SCHOOL ONE ARTIFACT REVIEW	81
SCHOOL TWO MEETING REVIEW	82
SCHOOL TWO ARTIFACT REVIEW	82
SCHOOL THREE MEETING REVIEW	83
SCHOOL THREE ARTIFACT REVIEW	83
SCHOOL FOUR MEETING REVIEW	84
SCHOOL FOUR ARTIFACT REVIEW	84
SCHOOL FIVE MEETING REVIEW	85
SCHOOL FIVE ARTIFACT REVIEW	86
EVALUATION OF MEETING GUIDELINES	87
 V. DISCUSSION	 90
HYPOTHESES AND FINDINGS	91
HYPOTHESIS ONE	91
HYPOTHESIS TWO	94
DESCRIPTIVE SUMMARY	95
LIMITATIONS	97
GENERALIZABILITY	101
CONCLUSIONS	106
 REFERENCES	 110
 APPENDIXES	 122
A. SURVEY INSTRUMENT	123
B. BLANCHARD PERMISSION LETTER	129
C. PERFORM INSTRUMENT INFORMATION	131
D. PERMISSION FOR CHESAPEAKE PILOT	133
E. PORTSMOUTH TRAINING SCHEDULE	135
F. TRAINING VALIDATION	137
G. PORTSMOUTH PARTICIPATING SCHOOLS' MISSION STATEMENTS	139
H. SURVEY RESPONSES TO DESCRIPTIVE QUESTIONS ...	142
I. IOWA TEST OF BASIC SKILLS OBJECTIVES	149

LIST OF TABLES

TABLE	PAGE
1. Descriptive Statistics for Pilot Study	49
2. Cronbach's Alpha for Pilot Study by Factor	51
3. Student Body Characteristics for Portsmouth Schools	60
4. Student Body Characteristics for Chesapeake Schools	63
5. Matched School Means	66
6. MANOVA Comparing System Scores	68
7. MANOVA Comparing ITBS Scores	69
8. MANOVA Comparing system Difference Scores	70
9. MANOVA Comparing ITBS Difference Scores	71
10. T-test for Age Comparison	73
11. Chi Square for Gender Comparison	73
12. MANOVA for High PERFORMing Team Survey	74
13. Training and Comfort Level with TQM Tools	80
14. Quality Meeting Guidelines Evaluation	88

LIST OF FIGURES

FIGURE	PAGE
1. Theoretical Framework of TQM Investigated	8
2. Path Analysis of Supportive Leadership	28

Chapter I

Introduction

Overview

Effective management is essential for an organization to perform optimally. In the world of business, various companies have been reexamining their management approaches, and many have been moving away from traditional autocratic practices. A similar phenomenon is occurring in the field of education.

At present, a majority of urban school systems in the United States base their management strategy on a system developed for industry early in the twentieth century by Frederick W. Taylor (1967), a system known as scientific management. Taylor's goal was to find the best and most efficient way for a job to be done and then to require a closely supervised workforce to follow a standardized procedure for that job (Dunham, 1984). As Wellins, Bryham, and Wilson (1991) have pointed out, "In effect, management did all the thinking and employees did all the doing" (p. 6).

Although Taylor (1967) espoused a close cooperation between managers and workers as necessary for success, such teachings tend to be disregarded today (Gray, 1993). Broadinsky (1982) has indicated that, under the Taylor system as it has been applied to school management, the

morale of teachers has decreased because of their exclusion from the decision-making process. Lowered morale adversely affects job performance.

This lack of participation in the decision-making process turns into a lack of commitment when teachers feel they are restrained from achieving good performance and feel they have little or no impact on the school environment (Beckner, 1990). Lack of commitment by teachers is seen as a contributing factor to the current situation, which is students leaving our schools with low test scores and with no job skills, and who seem apathetic and culturally ignorant (O'Looney, 1993).

A study by University of Michigan researchers indicates that only 23% of Americans work at peak performance (Bennis, 1984). The decrease in effort by workers results in decreased output or production. Organizational leaders must find new ways to empower workers in order to achieve a renewed commitment to their work (Bennis).

A number of schools are turning to Total Quality Management in order to find new solutions to problems. Total Quality Management, TQM, is a concept based upon participatory management and involvement of all employees (Newman & Diefenderfer, 1990). For example, in Virginia, Chancey, Grant Director for Commitment to Quality, indicated in a phone conversation that seven systems have implemented

total quality management as part of the state's pilot program directed by the Virginia State Department of Education in conjunction with Xerox Corporation. Other systems in Virginia which are not part of the pilot, such as Chesapeake and Hanover County, are also in the early stages of transition from the Taylor system to participatory management when leaders attend seminars and meet with consultants. Norfolk Public Schools first introduced participatory management into five schools nearly a decade ago and now has 17 schools using management teams. In Norfolk, the schools have control of a small budget to use in implementing instructional goals derived from looking at test scores and other data on students. Total quality management entails involving employees in using statistical quality-control techniques to achieve optimization of the systems or processes used throughout the organization aimed at satisfying customer expectations (Milakovich, 1991).

A key ingredient in total quality management is the use of teams, each composed of a small group of employees seeking to solve problems creatively (Hawley, 1985). The involvement of employees in creative problem solving results in better solutions with a greater sense of control and ownership among employees (Spindler & George, 1984). O'Donnell and O'Donnell (1984) indicate that the primary reason many businesses instituted total quality management

was to increase the contribution and involvement of employees. Schools are now beginning to utilize the TQM techniques to improve problem solving (Freeston, 1992). "Recent findings from studies that focused more on contextually relevant and consequential problems demonstrated that groups outperformed their most proficient member 97% of the time" (Michaelson, Watson, & Black, 1989, p. 327). When the staff members are involved jointly in decision making, they can influence decisions and contribute significantly to improvements in the educational delivery system.

Generating new ideas using the TQM approach will not be sufficient. The instructional leader must be able to implement the ideas via the change process. Teachers have traditionally resisted change when initiated by supervisors and principals (Hughes, 1991). It is hoped that through total quality management, a system for promoting change in the schools will remove the barriers to change which currently exist, resulting in new, creative solutions to problems (Holt, 1993). Implementing creative solutions to problems is possible with the empowerment of the total quality management team, which would consist of a representative selection of all staff members (Bonstingl, 1992a, 1992c, 1993, Scholtes, 1988).

Numerous scholars (Bonstingl, 1992a; Buffie, 1989;

Cherry, 1991; Chubb & Moe, 1990; Hansen, 1990; Hughes, 1991; Leatherman, 1992; Maeroff, 1993; In Search of, 1986) are advising teachers to assume more management responsibility, particularly in the area of instructional leadership, which is most needed in urban public schools. A total quality management system designed by W. Edwards Deming (1993; 1986) successfully combines promoting change, implementing creative problem solving, and empowering teachers while encouraging the faculty to participate in achieving the vision which they help establish. Employees wish to positively influence the organization for which they work (Maeroff, 1993). Bloom (1976) writes that faculty members in urban schools wish to establish conditions in which all students reach objectives for learning within an appropriate time frame which will result in a continued motivation to learn.

To optimize the system, Deming (1986) provided fourteen points to guide management in overcoming what he termed "the deadly diseases,"--seven barriers to good performance such as merit rating or annual review (p. 97). Deming believed 85% of all problems are the responsibility of management, while only 15% are the responsibility of the workers. Decisions are made based on the data provided by the system and, when indicated, changes are made to improve the system (Deming, 1986).

Although it is believed that TQM improves communication, morale, satisfaction, and trust while also providing for individual and team growth (O'Donnell & O'Donnell, 1984), current research does not indicate which of the TQM-related management policies will achieve the desired outcome (Cuban, 1984). Schmoker and Wilson (1993) therefore question the effect of total quality management in the educational realm. They suggest the following questions be asked:

Are school employees working together on the

school's most pressing academic priorities?

What data have been used to determine these

priorities? Are we making progress toward the

school's most important goals? What is working?

What isn't? How can we do better? (p. 395).

Kohn (1993a), a strong advocate of the Deming philosophy in the business setting, is equally strong in opposing the introduction of the Deming system into the field of education. In education, Kohn (1993b) feels the intrinsic motivation of students may suffer due to increased attention to student performance. Kohn is concerned that educators will inappropriately translate Deming's teachings or ignore some of his specific ideas such as eliminating slogans from the educational setting. Further, Kohn believes self-styled

TQM education proponents are indicating test scores will rise as a result of the implementation of TQM. Deming strongly advocates abolishing standardized tests and grades altogether. Admittedly, the issues of standardized tests and grades are generally ignored.

The transition to TQM begins with several key administrators in a school system attending a Deming Four Day Seminar. Step two involves recruiting trainers from within the system and providing extensive training for certification or hiring certified trainers from outside the system. Next, manuals and training materials are developed by the school system. Teams are then identified by the principal or elected by the faculty. Finally, teams attend four day training sessions which provide the basic TQM tools. Additional training is often provided by the school system each year. The transition to TQM is costly. Is the benefit worth the cost?

This study will attempt to show how the Deming TQM system in urban elementary schools affects the performance of student achievement and of the school improvement team characteristics of morale, recognition and appreciation, flexibility, purpose, empowerment, productivity, and relationships and communication. In Figure 1 the theoretical framework investigated in this

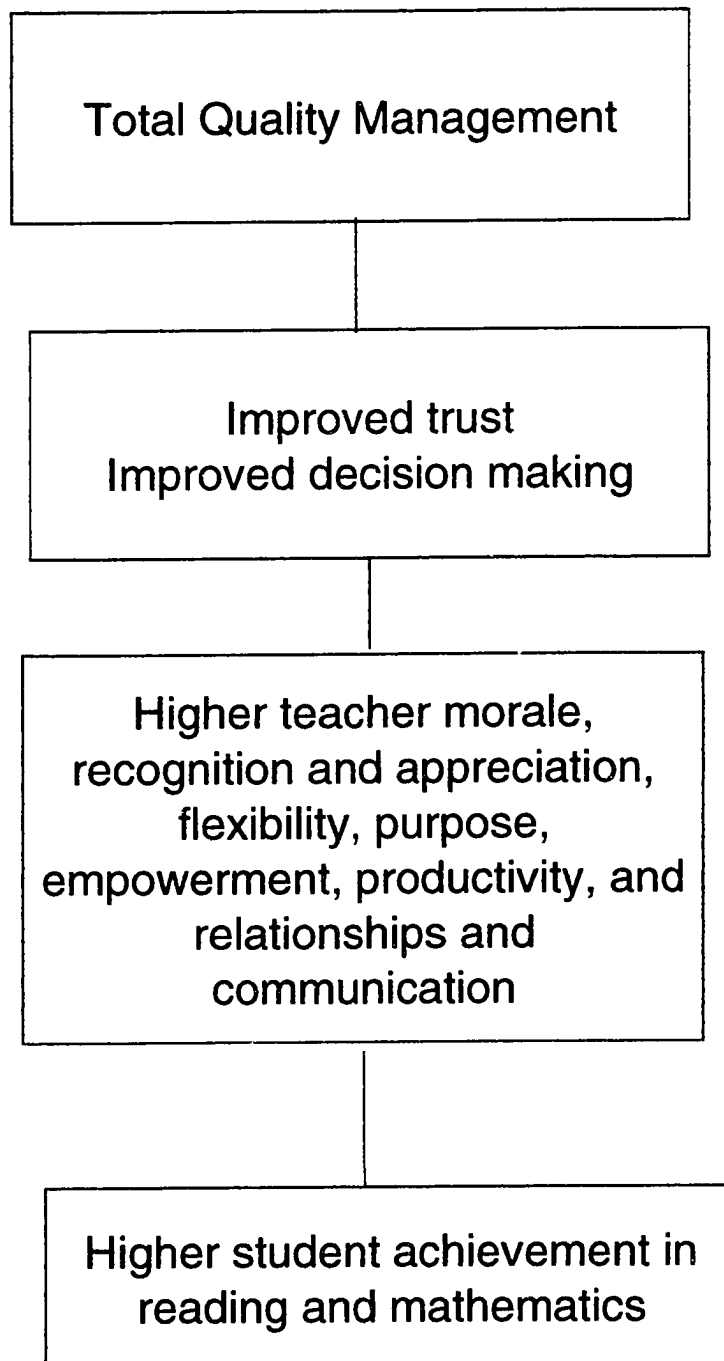


Figure 1. Theoretical Framework of TQM Investigated.

study is presented.

Purpose

The purpose of this study is twofold. First, the study investigates whether or not student scores in five urban elementary schools currently using total quality management are significantly higher on the fifth grade Iowa Test of Basic Skills Multilevel Battery Reading Comprehension and Mathematics Skills sections than are scores of students in elementary schools not using TQM. Second, this study determines if a significant difference is found between key staff members of non-TQM schools and school improvement team, SIT, members of the TQM school on the High PERFORMing Team Survey, HPTS.

Hypotheses

In conducting this study, the following research questions were addressed:

1. There will be a difference in the mean Iowa Test of Basic Skills scores in student reading comprehension and total mathematics between urban schools using total quality management and urban schools not using total quality management?

2. There will be a difference in mean scores on the sub-categories of teacher purpose, empowerment, relationships and communication, flexibility, optimal

productivity, recognition and appreciation, and morale as well as the total mean score between urban schools using total quality management and urban schools not using total quality management.

Design

This study is quasi-experimental study using the nonequivalent control-group design. The treatment is the TQM training given to the Portsmouth Schools' site teams. The TQM teams are compared to the non-TQM teams and the students from the TQM schools are compared to students from the non-TQM schools. Characteristics and school descriptions are included to provide further data to support the study. Bernd (1992) submits that participatory management which does not address the most important issues will not be successful. The descriptive questions included in the team survey were designed to indicate if these issues are being addressed.

Significance of The Study

Currently, there is a lack of research data pertaining to the impact of total quality management on the performance of teachers and students in urban elementary schools. While research has shown that elementary teachers tend to prefer participatory leadership, no research is available to show any

effect of the total quality management system on student achievement or teacher purpose, empowerment, relationships and communication, flexibility, optimal productivity, recognition and appreciation, and morale in elementary schools. Reform movements that emphasize new curricula and new management techniques have been introduced in order to alleviate the myriad of problems that exist in urban schools today. Administrators and teachers require research-based solutions which will work in the schools as the schools operate on a day-to-day basis. This study seeks to provide information which will help other school systems decide if the expense of making a transition to total quality management is worth the cost in dollars and human effort.

Limitations

In designing a study of a school management system, it would be impossible to control every aspect of any school in order to study the impact of an intervention such as TQM. Typically, problems which exist in one school may not exist in another or may be found to a lesser degree. An administrative change, such as the transfer and replacement of a principal, assistant principal, or grade level chair may impact the school either positively, negatively, or not at

all. Additional support personnel or innovative programs may also result in positive, negative, or no change in a school. This researcher has attempted to identify instances where such changes in personnel or programs have occurred in each of the ten schools used in this study. The key aspect of the evaluation was determining if data was used to guide the team in developing strategies and selecting programs for implementation.

Selection is a possible issue as the schools were chosen for exceptional use of TQM. Portsmouth School System has been recognized by the United States Senate and thus receiving media attention for its TQM initiative.

The Hawthorne effect could be confounding as the trainers, central office administration and superintendent visit schools during TQM meetings and functions. The implementation of a specific program in a school is often determined by the principal or person directly responsible for the program at the site. By having an administrator from central administration present, incorrect implementation of a program is more difficult but treatment fidelity is a possible problem since the central administration representative is often not present.

While it is hoped that the total quality management system is properly implemented at each site, in actuality, the existence of five different adaptations may have occurred. The description of each site's meetings and answers to the questions about the individual schools will help to determine if TQM is being properly implemented at each site or if an adaptation has occurred which functions improperly.

The Portsmouth Schools used in this study were all urban elementary schools with the third, fourth and fifth grade levels in the same building. Students are exposed to the same School Improvement Team decisions at each site. The teachers in each building are allowed access to the same team and react positively or negatively to the team improvement efforts.

School systems with elementary grade level divisions that differ from those used in this study may not show the same results. Because middle and secondary schools are different from elementary schools organizationally, they would require separate research on each level.

A school system with goals different from the Standards of Learning, SOLs, used in Virginia may not show the same results.

Definition of Terms

Terms used in this study are defined as follows:

Participatory management: A management system which involves employees in the decision making process.

Total quality management: A management system which involves all employees in using quantitative methods to improve continuously an organization's systems (Deming, 1993).

School Improvement Team: A group of individuals whose purpose is to develop and implement the school improvement plan using shared decision making. The principal must attend and parents must be included on the team to equal one third to one half the membership. All school departments must be represented. Meeting times should vary with evening meeting scheduled to allow for more parental involvement (Portsmouth Public Schools Guidelines for School Improvement Teams).

Purpose: Individual faculty commitment to the team process and team goals (Blanchard, Carew, & Parisi-Carew, 1990).

Empowerment: Team members understand that they have the authority and responsibility to make decisions in matters which affect their work (Wellins, Bryham, & Wilson, 1991).

Relationships and communication: Team members have positive, professional interactions and freely share information (Blanchard, Carew, & Parisi-Carew, 1990).

Flexibility: Individual team members are amenable to performing various tasks and providing leadership when possible, while exploring new solutions and supporting change (Blanchard, Carew, & Parisi-Carew, 1990).

Optimal productivity: Performance of the team process and accompanying managerial tasks are performed at the highest level (Blanchard, Carew, & Parisi-Carew, 1990).

Recognition and appreciation: Contributions by team members are recognized by the school leaders and system leaders, resulting in respect for the accomplishments of team members (Blanchard, Carew, & Parisi-Carew, 1990).

Morale: Team members feel that their work is having a positive impact, resulting in a strong group loyalty with confident and motivated members (Blanchard, Carew, & Parisi-Carew, 1990).

Academic Achievement: The cognitive level which the student should reach at the completion of grade five as demonstrated on the Iowa Test of Basic Skills (Chubb & Moe, 1990).

Urban Schools: Three characteristics are necessary to define a school as urban: a. Problem-plagued schools, b. Heterogeneous environment, and c. Bureaucratization (Chubb & Moe, 1990).

Site based management: A participatory management style that involves the control of identified funds at the specific site (Guthrie, 1986). The school will have power to develop rules, regulations and policies at the site which do not violate school board policy (Fields, 1993).

Fishbone analysis: A cause and effect diagram represents the relationship between some "effect" and all the possible "causes." The effect or problem is stated on the right side of the chart and the major influences are listed on the left (Brassard, 1992, p. 24). The fishbone analysis was Invented by Ishikawa and is also called the Ishakawa diagram or cause and effect diagram.

Chapter II

Review of The Literature

Overview

The job of the principal in today's urban school is so extensive that faculty involvement is necessary for effective school management (Anders, Centofante, & Orr, 1987; Cherry, 1991; Donmoyer & Wagstaff, 1990; Principals and Leadership, 1988). Team management at the site level is being implemented in many urban school systems. This strategy is based on research indicating that effective leaders in business are more likely to use a participatory team style of leadership (Meaney, 1991). Chance (1989) indicates that teams reduce duplicated effort, increase cooperation, encourage new ideas, increase problem solving, increase motivation, and improve product quality. Additionally, team members have a clear vision, listen respectfully to other opinions, accept and give constructive criticism, and work to reach a consensus on solutions (Chance). Through the process of team building, morale is increased as personal conflicts are eliminated (Zahara, Beebe, & Wiebe, 1985). Furthermore, the group becomes united in its efforts to solve problems (Chance; Corbett, 1983; Ingle, 1982).

Gezi (1990), in his review of studies conducted in urban schools, determined leadership was necessary for

setting goals and for solving problems. He also contends that leadership aids in developing teams, in making shared decisions, and in monitoring and accessing pupil progress. Gezi believes leadership provides the school not only with the vision, but also with a positive school climate, excellent communication, and a support system. These four characteristics, Gezi maintains, are necessary for increasing a sense of ownership, maintaining enthusiasm and commitment, and instilling pride in achievement. Toward this end, Gezi recommends that schools implement team management. Mentell (1993) and Thierbach-Schnieder (1984) concur with Gezi in the belief that morale will increase with a more professional environment due to team management thus an increase in the quality of instruction.

There are times when team management is recommended and times when authoritarian management is recommended. Smither (1991) indicates authoritarian management may be more effective when:

1. Employees are poorly educated or uninterested in either responsibility or the organizational mission,
2. Productivity is more important than employee satisfaction,
3. The focus of performance is short-term rather than long-term,

4. The manager is comfortable with a directive style, and,
5. The emotional ties between leaders and followers are sufficiently positive so that workers will not resent strong direction (p. 44).

Smither (1991) further indicates team management to be effective when:

1. Management visibly supports the participative approach,
2. Employee groups are generally well-educated and they support the organization's goals,
3. Team leaders are skilled at running team meetings effectively, and,
4. The organization can afford considerable amounts of lost time and productivity while team members learn to trust each other and work together (p. 40).

Participatory Team Management

In re-analyzing the data from the original Western Electric Hawthorne Studies where Sashkin found increased production in the late 1930's, Franke and Kaul (1978), using advanced statistical techniques, determined no increase in productivity as a result of employee participation. The researchers also indicate that, in the Harwood-Weldon

studies and the study done at Keithly Instruments, the many factors introduced simultaneously did not allow for isolation of effects and could not be attributed to the implementation of participatory management.

In evaluating fifty studies which did isolate participative management, Schweiger and Leana (in Locke, 1986) determined results to be inconclusive, indicating that both effective participatory and effective authoritative decision making may lead to the same productivity levels. After isolating thirteen studies where participatory management was successful (Fox, 1957; Katzell, Miller, Rotter, & Venett, 1970; Ley, 1966; Lischeron, & Wall, 1974; Rynyon, 1973; Seeborg, 1978; and others) for a meta analysis, Schweiger and Leana note:

Using participation intelligently requires an understanding of the mechanisms by which it works and the conditions under which these mechanisms will most likely operate. Motivational and cognitive mechanisms are most important. The motivational mechanism includes such factors as trust, greater control of the work, more ego involvement in the job, increased identification with the organization, more group support (if it is group participation) and most important, the setting of higher goals and/or increased goal

acceptance.

The cognitive mechanism includes more upward communication, better utilization of information (especially when the supervisor does not have sufficient information to make a high-quality decision), and better understanding by employees of the job and the rationale underlying decisions (Locke, 1986, p. 69).

Increasing the levels of these motivational and cognitive mechanisms through the use of TQM, a type of participatory team management, could result in increased employee effort and morale due to increased employee contribution and understanding.

Total Quality Management

Deming (1986) has provided 14 points to guide an organization in effectively focusing its efforts. According to Deming, management must use the following 14 points:

1. Create constancy of purpose toward improvement
2. Adopt a new philosophy
3. Cease dependence on inspection to achieve quality
4. End the practice of awarding business on the basis of price tag
5. Improve constantly and forever the system of

production and service, to improve quality and productivity, and thus constantly decrease costs

6. Institute training on the job
7. Institute leadership
8. Drive out fear, so that everyone may work effectively for the company
9. Break down barriers between departments
10. Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity
- 11a. Eliminate work standards
- 11b. Eliminate management by objective
- 12a. Remove barriers that rob the hourly worker of [their] right to pride of workmanship
- 12b. Remove barriers that rob people in management and engineering to their right to pride of workmanship
13. Institute a vigorous program of education and self-improvement
14. Put everybody in the company to work to accomplish the transformation (p. 23-24).

While 176 companies instituted TQM by 1981, 60% were less than pleased with the results produced by the process and indicated that 12 companies had ceased using total

quality management (Main, 1984). Authorities (Main; Schenkat, 1993) on total quality management indicate that support from top management is essential for the success of this approach. The leaders must, on a consistent daily basis, encourage, recognize and promote the efforts of the participants. Deming (1986) believed it was this lack of support that initially caused the process to fail in the United States in the 1940's. Lack of commitment to TQM by middle management--the principals and supervisors--will also lead to failure (Scholtes, 1988).

Previous Research

Despite extensive research on the management of schools, there is a dearth of research on the effective management of an elementary educational institution using the team management approach. One study (Wilcox, 1993) of team leadership style on the high school level indicated that teacher morale and job satisfaction were predicted by the leadership style used at the site. Another study (Burns, 1990), also on the high school level, indicated a participative style foremost in promoting job satisfaction and morale, while a consultive style was found to be secondary. Participatory leadership has been found to contribute to the growth of professional self-esteem and thus a positive morale (Spindler & George, 1984).

Additionally, attitude problems are likely to be

reduced because opportunities for formal and informal input are available to all employees, students, and parents, and no longer is one person responsible for setting goals for the group (Seaman, 1981). Lawler (1990) suggests that hierarchial leadership often lacks the ability to implement the decisions which are made. Using consensus in deciding policies and procedures should increase employee willingness to adapt readily to the new methods adopted by the institution.

An additional benefit of a participative style, on which Comer (For Children's Sake, 1991) and Deming (1986) agree, is the increased enthusiasm displayed by people toward their work. Employees work with more diligence and determination when they all have a voice, trust the system, and receive attention on relationship issues. Fiedler (1986) found conflict management is best dealt with in a collaborative manner. While collaboration admittedly requires the largest investment of time, energy and resources, the goal is to eliminate conflict quickly in order to reduce negative consequences and at the same time promote employee maturity and thereby organizational development.

Hansen (1991) pointed out that, for organizational growth and development to be successful through the use of participative management, several characteristics should be

present. First, members participating in the management of the organization must do so voluntarily. Second, the brainstorming process must be used to allow for input from all participants. Next, problems must be identified and defined by the group, based on the information gathered and data derived by the group. The fourth step would be the analysis and interpretation of the information to generate solutions which are then publicized, presented and implemented. Finally, the group process and solutions are evaluated for effectiveness. According to Hansen, these characteristics encourage a commitment by members of the team which will improve the implementation phase.

Although Hansen (1991) emphasized the importance of the voluntary association of members, not all participatory management teams are formed in this manner. In one study over a three year period, Tang, Tollison, and Whiteside (1987) indicated that teams initiated by management not only solved a greater number of problems more rapidly than the self-initiated teams, but also selected problems at a higher level of difficulty.

When using teaming for instructional improvement, Anders, Centofante, and Orr (1987) found in their study that "The growth within the school of both staff and students creates a more positive school climate. Within such a climate mutual trust and respect flourish, and morale stays

high" (p. 63). Research by Steel and Lloyd (1988) in a military setting found trust significantly higher due to implementation of total management. The primary source of satisfaction for teachers is the feeling that their efforts are having a positive impact on improving the educational outcomes of their students (Duke, Showers, & Imber, 1980). Other satisfiers such as feelings of self-efficacy, ownership, and workplace democracy are increased with team management and are currently seen as lacking in urban schools (Duke, Showers, & Imber).

Harris (1989), in his study of principals of urban schools cited for excellence, found participatory decision-making, trust, staff development, independent action, and acknowledgment to be the important factors which should be present in the school. In another recent study, a path analysis was used to determine factors which influenced both school culture and perceived school effectiveness. In the study (Hoy, Tarter, & Witkoskie, 1992) using a multiple regression analysis, faculty trust was the only factor shown to have a significant influence on perceived school effectiveness. The authors indicated the four components of school effectiveness used in the study were "quantity and quality of the product, efficacy, adaptability, and flexibility" (Hoy et al., p. 39). The multiple regression path analysis was revised, with the results indicating that

supportive leadership influences trust in the principal and collegiality (Hoy et al.). These factors in turn influence faculty trust (Hoy et al.). Figure 2 represents this path analysis.

Hemphill and Coons (in Bowers & Seashore, 1966), in their study of mostly educational groups, identified three pertinent factors pertaining to leadership. The first, is maintenance of membership character. Leader behavior in this case is of a friendly, agreeable nature. These behaviors are interpreted by the group as acceptable. The second leadership factor is objective attainment behavior. Behaviors in this category are related to group production. In these instances, the leader encourages the goals or objectives to be established and group structure is also encouraged by the leader. The leader seeking objective attainment behavior must also present himself to outside groups as a representative. The third factor is group interaction facilitation behavior. The leader in this case is maintaining positive group relations by addressing conflict in an effort to alleviate it. Communication is encouraged by the leader in a specified fashion under this leadership factor.

While finding that elementary principals in Maryland provide instructional leadership in a top-down hierarchy without being limited to a highly directive style, Hoes

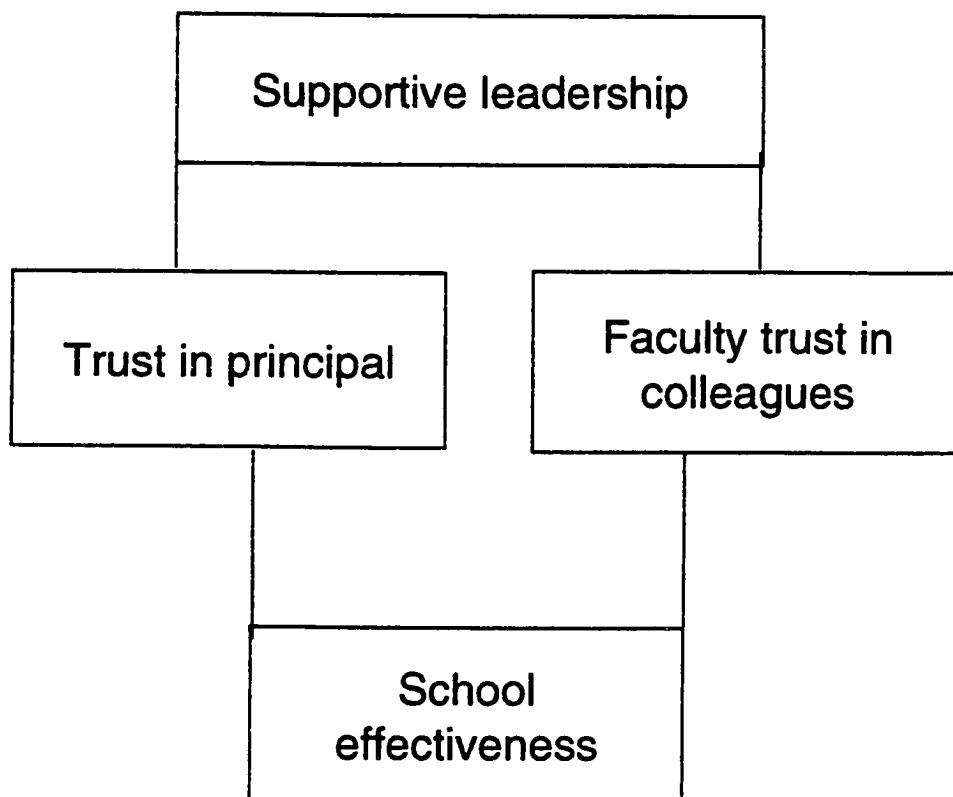


Figure 2. Path Analysis of Supportive Leadership.

(1991) calls for research using different methodologies and settings. Guetzow (1991) also found that elementary principal leadership style contributed to the schools' effectiveness in a traditional hierarchy.

While Sashkin (1988) indicates participation is effective and an ethical imperative, Locke, Latham, and Schweiger (1986) disagree. These authors feel participation is just another managerial technique which may be beneficial in some situations, but not in others. While schools have well-educated workers who can contribute greatly to the management, some school superintendents and principals are so conditioned to the autocratic style that TQM may be inappropriate in these cases.

Stern (1992) states that businesses often look to each other to find successful new programs. Often, when the program is transplanted to a different business with a different culture, the same results are not achieved by the second company. When the programs do work, the programs have often undergone many major changes to adapt them to the new culture. Stern cautions that, while team management is currently seen as the better way to make decisions, poor decisions may also result when different opinions are not valued, or when participants are punished for expressing opinions different from those of the formal leader. The ability of the leader to accept differing opinions is a key

factor.

Additionally, it has been stated by Yukl (1981) that leadership is not the only factor which will determine the success of a program, and this is particularly true in urban schools today. Kerr and Jermier (1978) suggest:

Certain subordinate, task, and organizational characteristics have the potential to `substitute for' or `neutralize the effects of' hierarchial leadership, and that the presence of these variables may weaken the relationships between leader behaviors and subordinate criterion variables (p. 2).

By augmenting the principal's leadership with team leadership, the barriers which neutralize leadership can be diminished. Deming (1986) lists the following management barriers to a quality performance under the Taylor management system:

1. Lack of constancy of purpose.
2. Emphasis on short-term thinking and annual budget cycles.
3. The devastating effects of annual "merit" reviews and individual performance evaluations.
4. Mobility of senior management.
5. Managing by visible figures alone.

6. Excessive medical costs.

7. Reluctance to abandon programs (p. 97).

These barriers must be removed in order for commitment by both students and teachers to be renewed. The barrier which TQM must overcome is an autocratic management.

The TQM process is committed to removing all barriers to a quality performance. In many business organizations such as IBM and Xerox, TQM has increased production as well as reduced waste. The use of total quality management in schools would provide a framework for reform (Buckman & Sharp-Burk, 1992).

There can be a problem when the organization does not provide the resources and support necessary to bring about the changes proposed as a result of the TQM process (Lawler & Mohrman, 1985). Whitaker (1995) indicated that schools that used participatory management scored one standard deviation above the norm while schools which did not scored one standard deviation below the norm. By identifying teacher leaders in the building, the same principals were more successful in promoting change in the schools.

Another problem with instituting change in the schools is that a majority of teachers work independently for the most part. In Corbett's (1983) study of several schools which were interested in improving, the process led to different implementation patterns as various teachers

adapted or disregarded directives. The solution, according to Corbett, is to promote teacher interdependence within the organization to remove this barrier to change.

Promoting teacher interdependence would also help to provide additional supervision in a less threatening manner. Teachers have the knowledge and ability, due to their experience and training, to operate effectively without relying on direct supervision (Vecchio, 1987); however, motivation may still be greatly influenced by the type of supervision provided.

Training

The goal of total quality management is to eliminate all barriers to a quality performance for all members of the organization. Unfortunately, the trends in organizational administration are often translated incompletely or inappropriately to other settings, due to the desire to rush to implementation of the latest techniques before they are completely tested or understood (Norris & Vecchio, 1992).

To avoid such inadequate translation and ensure correct implementation of the TQM process, the organization must take care to provide extensive in-service and follow-up activities (Sasaki & Hutchins, 1984). As part of this training, it is necessary for the school system to train the school improvement team in the techniques they must use. Such training should not become overly complicated (Sasaki &

Hutchins, 1984). Schenkat (1992) indicates that quality training contains four factors:

1. Awareness of quality movement
2. Use of problem-solving tools (statistics and data analysis)
3. Development of group-process skills (leading meetings, teamwork, making presentations)
4. Development of job-specific skills (p. 52).

Inservices which cover brainstorming, conflict resolution, goal setting, force field analysis, and collaborative planning are necessary (Scholtes, 1988). Training, which covers the statistical techniques and charts, used in total quality management must also be taught to the group according to Scholtes.

Scholtes (1988) cites the main advantage gained by an organization is the learning of the scientific approach to solving problems by all members. Indeed, Honeycutt (1989) confirmed Zahara's (1982) findings, which indicated that no one factor was the most important contributor to success. He also found training to be the strongest contributor to success followed by management support. In Honeycutt's study, training lasted for four hours.

Bonstingl (1992b) lists "The Seven Traditional Tools" for TQM as the flow chart, the fishbone diagram, the pareto chart, the scatter diagram, the PDSA Cycle (plan, do, study,

and act), the histogram, and the control chart. Deming (1993; Scholtes, 1988) recently modified the PDCA Cycle, plan, do, check, and act, sometimes called the Deming Cycle or Schwart Cycle, to the PDSA Cycle. The seven newer tools (Bonstingl, 1992b) are the affinity diagram, the force field, the five whys, the cross-impact matrix (CIM), the decision wheel, and the checksheet. Other techniques which may be used include the nominal group techniques, questionnaires, benchmarking, surveys, dot plot and stem-and-leaf display, work flow diagram (Bonstingl; Ingle, 1982; Scholtes). Additional tools should be constantly added in order to better analyze data (Ingle).

The facilitator who provides training initially must be available to help the teams add to their TQM tools' repertoire because both initial training and ongoing training are essential to the success of the team (Sasaki & Hutchins, 1984). Ingle recommends that the facilitator receive training for three and one-half days.

Each school system may vary in the implementation process; however, the following guides are noted in studying systems which have pioneered the transition to TQM:

1. Lay the groundwork for quality.
2. Provide everyone in the system with opportunities for learning about their processes and systems and how they work.

3. Develop shared beliefs and understandings about children and schools.
4. Work with all stakeholders in the larger educational system to identify the shared aim for the school system.
5. Identify the key "customers" at all levels in the educational system.
6. Consistently serving the school system's aim, identify key suppliers and help them learn how to help you exceed your requirements.
7. Identify some indicators of a poor system.
8. Start collecting and reviewing data that will provide knowledge for improving the school system and its variations.
9. Elicit suggestions for improvement from the people who are close to a process.
10. Talk with and learn from other people who are on the same quality management path as your school system.
11. Get help from an outside consultant who knows quality management and understands how schools work as systems.
12. Align the school district in partnership with a business corporation that has itself begun a quality transformation.

13. Involve the larger community in a school's quality enterprise (Savary, 1992, p. 27-32).

The use of a company as an advisor in the transition to TQM, as recommended in Item 12, will help ensure that the transition process is sound and is recommended by Deming (Richmond, 1993). It is the responsibility of the educators to see that instructional improvement, which impacts the classroom, remains the primary focus of the total quality management process, in order to maintain teacher satisfaction with the process (Duke, Showers & Imber, 1980; Rothberg & Pawlas, 1993;). In the Portsmouth Schools, the key source of data used to improve the system is generated by the Iowa Test of Basic Skills, ITBS, and targets mathematics and reading.

Quality meeting guidelines must be implemented to have productive meetings. For example, the 100 mile rule is used to eliminate meeting interruptions. This requires each team member to evaluate whether they would respond to an interruption if they were 100 miles away. Also, the meetings start and end on time with all participants being punctual (Ingle, 1982; Scholtes, 1988). An agenda is developed and posted with adherence to time allocations (Ingle; Scholtes). Ingle also recommends participants listen and participate actively while not engaging in side conversations. Further, Ingle indicates that team participants work to reach

consensus, sharing responsibility for team progress. Rules and processes established by the group are maintained in the team's minutes with members free to consult as deemed necessary.

Summary

As a result of teachers becoming more highly motivated, as well as the improvements to the system due to the TQM process, the outputs of the system should reflect improved quality. In looking at problems in reading and mathematics, a quality performance in schools may be expected to result in higher student outcomes. The data from the ITBS is combined with current theory to improve practice.

The faculty should also benefit from the transition to the TQM process. As a result of the transition to TQM, each faculty member should become more attuned to their purpose, being more empowered, more collegial, and more flexible, while attaining optimal productivity, receiving more recognition and appreciation, and acquiring a higher morale.

Deming indicates that the transformation will take years (1993). Success may not be apparent in one year or even two years. When the 21 business leaders of Japan originally heard about continuous improvement and building quality into their products initially, Deming (1986) told them the process would take five years. However, the goal was attained in only four years. While recommending

longitudinal studies, Steele and Lloyd (1988) indicate that significant positive changes were evidenced in studies from ten months to three years in length, while no significant changes were evidenced in studies from three months to eight months in length.

Schenkat (1992) suggests that the evaluation of the transition to TQM should be accomplished by evaluating whether decisions are based on data, and if, as a result of these decisions, schools are improving in several areas. The two key areas by which achievement is measured in school are mathematics and reading comprehension (Bailey, 1992). Again, mathematics and reading comprehension are two areas covered by the ITBS and generate the data used to guide improvement of the system in Portsmouth.

.

Chapter III

Method

Research Design

The purpose of this study was to examine the relationship between TQM and student achievement, and TQM and faculty scores on the High PERFORMing Team Survey.

A quasi-experimental design was used to investigate the implementation of total quality management in the Portsmouth School System for both the student achievement section and SIT characteristics' section of this research. Since all the schools in the Portsmouth School System were involved in the transition to a TQM management style, a second school system, Chesapeake, was used as a match-control group.

Both schools systems used in this study are located in the Hampton Roads area, the 28th largest metropolitan area in the nation. Portsmouth serves a clientele composed of 65% African American and 33% Caucasian while Chesapeake's student enrollment is 33.3% African American and 64.6% Caucasian. Both of the school systems are in the state of Virginia and develop curriculums based on the Standards of Learning established by the state. Both of the school systems are also tested by the Iowa Test of Basic Skills which also guides curriculum development.

Also, a description of the TQM implementation process used in Portsmouth including the training process, a

description of five team meetings in person, and a description of five meetings from previous years' artifacts were used to provide additional information on the implementation of TQM in the Portsmouth Schools.

The data generated from this research were analyzed by computer. SAS Proprietary Software Release (6.08) was used for the MANOVAs, Tukey's post hoc tests, t-test, and chi-square. All data were entered into a First Choice (3.1) spread sheet to generate means and to prepare data for SAS Proprietary Software by saving as a Lotus Works file.

Assessment of Student Achievement: TQM

Exposure to TQM is the independent variable in this study, and the scores on the reading comprehension and total mathematics sections of the Iowa Test of Basic Skills Multilevel Battery (Hieronymus et al., 1988), are the two dependent variables in this section. Using a nonequivalent control-group design, five Portsmouth TQM Schools were compared to five Chesapeake Schools using the traditional management style.

Sample Selection of Students.

Fifteen fifth grade students enrolled in each of the five Portsmouth schools were selected at random from an alphabetical school roster by class from the spring of 1993 of the five schools exposed to TQM. Once selected, each student's attendance for 1991 and 1992 was verified to

satisfy a three-year exposure to the same School Improvement Team (SIT). If the student was not in attendance for three years at the same TQM school, the student was eliminated from the study and another student randomly selected until 15 subjects were identified. In one school, with only 49 fifth grade students, the total population of three-year returning students was 11 and all subjects were used. The total number of subjects from Portsmouth was composed of 15 subjects from four schools plus 11 from the fifth school yielding a total of 71 subjects. The Portsmouth schools were chosen by the Director of Instruction, Claude Parent, for their exceptional performance in the use of TQM.

The five Chesapeake Schools used were identified as not using a participatory management style by the Director of Research. Chesapeake students were selected from third grade school lists matching ITBS scores with the Portsmouth students by school. Students scores for the fifth grade were then secured in order to assure attendance for three years. If the fifth grade score was unavailable, another student was selected. Schools were matched in order to yield the closest possible total mathematics and reading comprehension scores from the ITBS for two schools. After matching the students, the scores of school systems were compared to assure that no initial difference existed between the groups. The ages of the students in the two groups were

compared using a t-test. A chi-square test was used to compare the gender makeup of the two groups. Socioeconomic status and race were described on a school wide basis.

Statistical Analysis.

The reading comprehension raw score and the total mathematics raw score from the spring of 1993 on the Iowa Test of Basic Skills were used to compare the achievement of the TQM designated schools to the traditionally managed schools. Difference scores were also computed by subtracting the 1991 scores from the 1993 scores.

A 2 X 2 multivariate analysis of variance (MANOVA) was used to determine if the two means after treatment were significantly higher for the TQM schools compared to the non-TQM schools at the .05 level of significance. When comparing more than one dependent variable for several groups, Borg and Gall (1989) recommend the use of a MANOVA indicating the Wilks lambda test, the most commonly used for this purpose. Tukey's post hoc follows when a significant *F* results.

A second 2 x 2 MANOVA was used to determine if a significant difference resulted when comparing the difference scores. Again, after a significant *F*, Tukey's post hoc was used.

In order to compare the gender composition of the sample from Portsmouth to the Chesapeake sample, a

chi-square analysis was used. Also, a t-test was used to compare the age of the Portsmouth sample to the age of the Chesapeake sample.

Assessment Instrument: The Iowa Test of Basic Skills Instrument.

The reading comprehension section on the ITBS (1988) includes the subcategories of facts, description/categorization, relationships/context, inferences, cause and effect/conclusions, traits and feeling/motive, generalizations, main idea/organization, application/purpose, and language/mood/style. The total mathematics section includes the subcategories of mathematics concepts, problem solving, and computation.

The ITBS testing service sends an individual student's score, which is retained in the student's file folder, and a master printout of all students' scores by school which is retained by the Portsmouth and Chesapeake school systems' research department. The reading comprehension score on the ITBS has a reliability score of .93. The reliability for the mathematics concepts section of the ITBS is .83, .89 for the problem solving section, and .90 for the computation section.

The ITBS test was developed with the aid of many textbooks, professionals, and school authorities, and is continually reviewed by teachers and administrators from

school systems across the country. Initially the test items were piloted on 4300 pupils in each grade level from 35 states (Hieronymus et al., 1988). Additionally, items are checked by "educators of diverse cultural and geographic backgrounds" in an attempt to eliminate questions which are culturally biased (p. 4). Form G of the ITBS test is administered via the graded testing plan which issues the same test level to all students in the fifth grade or third grade allowing for comparing scores for all students (Hieronymus et al., 1986). Questions on the ITBS are in the multiple choice format.

The ITBS was the standardized test selected by the Virginia Department of Education because it most closely matches the Standards of Learning, SOL. The SOLs are the guide used by all Virginia school systems in developing local curriculum.

The ITBS provides detailed instructions for the administration of the test. The importance of maintaining a well lit, comfortable, and quiet test environment is stressed in the test manual. The proctor is directed to read verbatim the instructions provided in the Teachers Guide: Multilevel Battery (Hieronymus et al., 1986) for each section of the test.

Schools may choose from two plans for administering the ITBS (Hieronymus et al., 1986). Plan A has four test

sessions composed of three 75 minute sessions and one 80 minute session. Plan B has eight sessions composed of three 30 minute sessions, one 35 minute session, and four 45 minute sessions. Social studies and science sessions are optional adding a fifth 80 minute session to plan A and two additional 35 minute sessions for plan B. Both Portsmouth and Chesapeake use plan B for administering the ITBS on the elementary level.

The average increase in scores across grades for the ITBS is set at 12 standard score points per year (Hieronymus et al., 1988). One hundred is the mean score for the third grade for both mathematics and reading. The fifth grade level mean standard score would be 124 for both areas.

Assessment of Teachers: TOM

Exposure to TOM is the independent variable while the School Improvement Team, SIT, total score on the High PERFORMing Team instrument, (Blanchard, Carew, & Parisi-Carew, 1990), scores on the sub-categories of purpose, empowerment, relationships and communication, flexibility, optimal productivity, recognition and appreciation, and morale are the dependent variables. A static-group comparison design was used, indicating no pretest and no random assignment.

Sample Description.

The five schools from Portsmouth had their School

Improvement Teams complete the High PERFORMing Team Survey in the spring of 1994. The total number of SIT members from the five Portsmouth schools was 56. Scores on the instrument were secured for the five Chesapeake elementary schools which are not currently using total quality management during the same time period. Grade level chairpersons and their alternates were asked to complete the High PERFORMing Team instrument along with the school principals. Other appropriate faculty members or parents that the principal would place on an advisory council or school improvement team were also used. The selection of site teams initially was handled by the principal, provided the chosen member elected to participate. A sample resulting in 12 subjects per school was identified for each Chesapeake school. The total Chesapeake sample was 60 subjects.

Statistical Analysis.

Scores on the sub-categories of purpose, empowerment, relationships and communication, flexibility, optimal productivity, recognition and appreciation, and morale were determined. Grand means were determined for each sub-category for TQM and non-TQM schools. A 2 X 7 MANOVA was used to compare the resulting seven mean scores for each of the two types of schools, while testing for an overall difference between the two groups. A .05 level of significance was used to determine if scores were

significantly different (Borg & Gall, 1989).

Assessment Instrument: The High PERFORMing Team Survey.

The High PERFORMing Teams Survey, HPTS, used in this study is found in Appendix A, and the letter of permission to use the Survey from the Blanchard Institute is in Appendix B. Since there does not currently exist an instrument with reliability or validity established pertaining to team management, the areas covered in this instrument are supported in the review of the related literature. The coauthor of the Survey, Kenneth Blanchard, was a professor of leadership and organizational behavior at the University of Massachusetts, Amherst, where he conducted extensive research on leadership. Donald Carew, another coauthor, was a professor of applied behavioral sciences at the same institution and, along with Eunice Parisi-Carew, developed the instrument for the Blanchard Training and Development Institute in 1989. The Blanchard Institute works extensively with teams in both the public and private sector to develop successful team skills leading to improved performance. In a personal communication with this researcher, Parisi-Carew wrote, "The PERFORM rating scale is based on the authors' survey of the literature regarding the characteristics of high performing teams as well as informal research done with several of our client teams" (see Appendix C). Thus, using this instrument, as Spector (1992)

describes, would yield a known-group validity.

Reliability.

In order to perform Cronbach's alpha, as recommended by Carmines and Zeller (1979) to determine the High PERFORMing Team instrument's reliability, the instrument was sent to 45 people who are currently elementary teachers or administrators on the third, fourth or fifth grade levels in the Chesapeake Public School System. Chesapeake is an urban school system with boundaries adjacent to the Portsmouth School System. A permission letter for the pilot study was secured (see Appendix D). According to Borg and Gall, "If subjects are taken from a well-defined professional group, such as school superintendents, as few as 20 cases will often be sufficient" (1989, p. 435). Surveys were delivered to the principals of four schools for distribution to the subjects. Of the 45 surveys delivered, 38 were returned, with four surveys being unusable due to several blank answers on each survey. The 34 usable surveys indicate a return rate of 75.5%.

The questions were rated from one (low) to five (high). Participant mean responses ranged from a low of 2.764 to a high of 4.294. The resulting descriptive statistics for each question are listed in Table 1.

Table 1

Descriptive Statistics for Pilot Study

Question	<u>M</u>	<u>SD</u>	Sum	Minimum	Maximum
1	4.294	0.83591	146	2.0	5.0
2	3.852	1.07682	131	1.0	5.0
3	3.558	0.95952	121	1.0	5.0
4	3.911	0.86577	133	2.0	5.0
5	2.794	1.29754	95	1.0	5.0
6	3.441	1.15971	117	1.0	5.0
7	3.617	1.07350	123	1.0	5.0
8	3.352	1.09772	114	1.0	5.0
9	3.147	1.30575	107	1.0	5.0
10	3.235	1.15624	110	1.0	5.0
11	3.235	1.20752	110	1.0	5.0
12	2.970	1.21818	101	1.0	5.0
13	4.000	1.04447	136	1.0	5.0
14	3.176	1.33654	108	1.0	5.0
15	3.852	1.20937	131	1.0	5.0
16	3.705	1.08793	126	1.0	5.0
17	3.558	0.95952	121	1.0	5.0
18	3.882	0.84440	132	2.0	5.0
19	3.529	1.05127	120	1.0	5.0
20	3.500	0.89612	119	2.0	5.0

Table continues

Table 1 Continued

Question	<u>M</u>	<u>SD</u>	Sum	Minimum	Maximum
21	3.382	1.34873	115	1.0	5.0
22	3.352	1.15164	114	1.0	5.0
23	2.764	1.15624	94	1.0	5.0
24	3.088	1.11104	105	1.0	5.0
25	3.500	1.08012	119	1.0	5.0
26	3.264	0.89811	111	1.0	5.0
27	3.705	0.97014	126	1.0	5.0
28	3.088	1.13798	105	1.0	5.0

Note. N = 34

The Cronbach's alpha for each of the seven factors are listed as standardized scores in Table 2. The results range from a low of 0.776939 to a high of 0.951327. These scores represent median to low-high scores for an instrument which measures attitude scales (Borg & Gall, 1989). The alpha for the whole instrument was 0.96. A reliability score of 0.96 is considered to be high for attitude scales (Borg & Gall). For the reliability, the first two questions for each category were compared to the second two questions for each category.

Table 2

Cronbach's Alpha for Pilot Study by Factor

Factor	Cronbach's Alpha
Purpose	0.807029
Empowerment	0.829733
Relationships & Communication	0.951327
Flexibility	0.776939
Optimal Productivity	0.835566
Recognition & Appreciation	0.889601
Morale	0.823925

Note. Standardized variables used

While using the instrument to determine the reliability, the researcher ascertained the need to replace the word *teachers* with the word *faculty* in several questions. The instructions were modified to emphasize the questions were in reference to the entire staff of the school, not individual teachers.

Additional questions were added to the survey of TQM schools to gain further information on the training completion and the comfort level in the use of the individual TQM tools (see Appendix A). The SIT members were asked to identify improvement efforts that were working and those that were not working. Next, members were asked if the most important school issues were being addressed and what data had been used to determine issue importance. In order to evaluate the range of teaching experience covered by the SIT, members were asked to indicate the number of years they had taught. Additionally, the SIT members were asked to indicate if their principal was autocratic or participatory in their leadership style and if their principal regularly attended SIT meetings. Finally, members were asked which topic areas had previously been addressed by the SITs.

Survey of The Teachers

The resulting HPTSSs were mailed to the five schools in Portsmouth to be distributed to the 56 subjects with

instructions that the instrument would be picked up by the researcher when attending the SIT meetings in each of the five Portsmouth schools. Instructions requested all members of the SIT to complete the survey. The instrument was delivered to the principals of the Chesapeake Schools with self-addressed, stamped envelopes. The stamps for each school were a different design to allow for identification by the researcher. Instructions requested that the principal complete the survey and distribute it to assistant principals, grade level chairs and grade level chair alternates and additional teachers as needed to reach a total of 12 people who would likely be selected for an advisory council or school improvement team.

TQM Training and Implementation Process

In Portsmouth, the School Improvement Teams have received training in total quality management by certified trainers who were taught by the Virginia State Department of Education. The Director in charge of Total Quality Management in Portsmouth has also received training from Xerox Corporation. Xerox, having won nine TQM awards including the most coveted Deming sward in the United States, the Baldrige Award, is considered a leader in the TQM style. As a recipient of this award, Xerox Corporation was committed to working to help another group to implement TQM. Thus, as part of a ten-year pilot program, Xerox is

working with the Virginia State Department of Education to pilot the program in seven school systems. Portsmouth is one of the seven school systems participating in the pilot. Both Bonstingl (1992b) and Ingle (1992) are among those who recommend teaming with an organization which is currently successful with TQM.

Training occurs in groups of 25 at a conference facility in a local hotel. The training agenda used by Portsmouth School System is included in Appendix E. The training sessions last four days, with a total instructional time of 32 hours. Key aspects of the training are presented as video or slide presentations which ensure consistency and are also contained in Commitment to Quality (1990) by Virginia Public Schools, in partnership with Xerox Corporation. In addition, the Quality Training Participant Workbook and the Quality Improvement Process User's Manual, developed by the same partnership, are also used as training materials.

The Grant Director for this project with the Virginia State Department of Education worked on the implementation of this pilot project and participated in training the facilitators. Training was provided for four days as the "Commitment to Quality" workshop (see training agenda in Appendix E) and for four days as the "Commitment to Quality: Train-the-Trainer" workshop. The state grant director

reviewed the training provided by Portsmouth Schools, concluding the training is following the curriculum established, is using the training handbook and audiovisual materials, and is maintaining the integrity of the "Leadership through Quality" training (see Appendix F).

The School Improvement Teams were established in 1990. The principals have been instructed that all suggestions will be implemented unless school board policy is violated. In this case only, the principals may veto suggestions. Three citywide facilitators are available to help the teams. The Team Handbook by Peter Scholtes is the guide used for team-building (1988). It is based on W. Edwards Deming's theories that are the foundation of the Commitment to Quality project. Deming reviewed the book and wrote the foreword, which acknowledges Scholtes as providing the route for the change process to follow. Notes concerning various topics were sent to Scholtes by Deming. Deming's handwritten notes appear throughout the book for further clarification.

Recommendations for school improvement are a result of a specific process which starts with each of the School Improvement Teams identifying a problem and gathering data relative to the problem to be addressed. Once the problem is thoroughly studied, solutions to the problem or means of reducing the impact of the problem are determined. The School Improvement Teams use brainstorming, nominal group

technique, and multivoting or the Crawford slip method to generate new ideas, determine which problems are to be addressed by the specific group, and decide which course of action is appropriate to deal with the problems (Bonstingl, 1992b; Ingle, 1982).

The goal is to reduce variation, mistakes and defects, breakdowns and delays, and inefficiencies in the system. Decisions are based on data available on the system to be improved. The aim of the team is the optimization of the system. Once the decision is made to follow a specific course of action, data are again collected on a pilot implementation of the idea to check for improvement.

The role of facilitator should be designated for each school (Scholtes, 1988). Team leaders were verified for each of the five schools by the researcher during site visits.

Tools common to total quality management include flowcharts, top-down or detailed design, work-flow diagrams, deployment charts, Pareto charts, and cause-and-effect diagrams (fishbone diagrams or Ishikawa diagrams). Other frequently used TQM tools are stratification and Is/Is-Not analysis, time plots, control charts, dot plots with stem-and-leaf diagrams, check sheets, and scatter diagrams. In addition, an operational definition that includes how any improvement effort is measured must be developed. The facilitator is responsible for keeping these artifacts of

the TQM process, as well as minutes and agendas for meetings, presentations, and copies of correspondence.

Portsmouth School System requires school improvement team meetings at least once a month during the school year. A check list was designed by this researcher to indicate which of the above techniques were used during the SIT meetings. Records were reviewed for one month from the three previous years, selected at random, except school four which had no artifacts from previous years. One meeting for each of the five schools was attended by the researcher between April and June of the study year. The nine meetings reviewed equaled 7.5% of the meetings which occurred over the three-year period for which records were maintained.

Previous recommendations for improvement should appear in the artifacts from previous meetings (Scholtes, 1988). Information concerning previous topic areas addressed by the School Improvement Team was requested by an item on the survey instrument. These topic areas were compiled with the implementation of improvement recommendations verified during phone calls to the team leaders after the site visits by the researcher.

Although each team member should have received training from the certified trainers during a four-day workshop, which included training in the use of the techniques listed in the questionnaire, six members did not receive training.

Two of the six members were co-chairs. Team members were asked to place a check by the items in the list of techniques in which they were trained and another check by the repeated list of techniques which they were comfortable using. Team members were also asked to indicate the month and year that they completed training.

In addition, questions (see Appendix A) were asked of the principals and teams of the urban total quality management schools. Answers were compiled to yield valuable insight into the TQM process as implemented in the schools. It is known that participatory management that does not address the most important issues will not be successful (Bernd, 1992). This survey allows the SIT to indicate if the most important issues were addressed in each individual school.

The five Chesapeake schools were recruited for this study by indicating to the Director of Research that the traditional top down administration which does not encourage participatory management is the management style being sought for this study. The TQM system was described to the Director. Principals were questioned by the researcher to confirm that team management is not used in the management of any of the five schools.

Portsmouth Schools' Characteristics

Following is a description of the five individual Portsmouth schools used in this study. The five Portsmouth Elementary Schools included in this study were numbered one through five for identification purposes. The school system spends \$5100 per student per year for the elementary grades. The superintendent has issued a statement that all schools will improve scores on the Iowa Test of Basic Skills by 10% during one year.

An atypical school characteristic indicates that one elementary school, school four, has been in use for 70 years (see Table 3). Another school, school three, had approximately twice the number of gifted and talented students than the other schools (see Table 3). Another atypical characteristic was that school two had over three times the number of students than any of the other four schools. School two had three administrators, resulting in a one to 426 ratio of administrators to students for the schools in this study. Finally, school four with a student population of 369 had two administrators resulting in a one to 184 ratio. This ratio is much lower than the other four schools.

School one has the only promotion rate not in the 90% range with an 87% (see Table 3) while also having the highest free lunch program with 83.9% of the students

Table 3

School Characteristics for Portsmouth

School	Black	White	Black	White	Free	Year	Size	Special	Gifted	Promote
	Female	Female	Male	Male	Lunch	Occupied		Ed		Rate
One	37%	7%	44%	10%	83.9%	1957	422	11.4%	9.9%	87%
Two	29%	16%	31%	22%	50.9%	1986	1428	7.9%	14.0%	93%
Three	20%	23%	25%	31%	45.5%	1960	461	7.1%	18.4%	96%
Four	36%	12%	38%	12%	74.0%	1924	369	7.2%	10.6%	91%
Five	26%	19%	32%	21%	77.7%	1957	442	10.8%	9.3%	95%

participating (see Table 3). Student percentages for black female, white female, black male and white male appear in Table 3. The percentages ranged from a low of 7% to a high of 44% in school one. The percentages in the other schools did not have as large a range. With a total of 3122 students in the school system, of whom 1132 are white, about a 36% total white population would be expected per school. School one had only a 17% white population while school three had a 54% white population.

The special program currently in three of the five schools was Chapter One with Reading Recovery and Higher Order Thinking Skills, HOTS. The Chapter One schools include school one, school four, and school five.

The mission statements for all five schools are listed in Appendix G. Mission statements were developed by each school's School Improvement Team as the transition to a quality school began and are continually updated.

Chesapeake Schools' Characteristics

The five schools from Chesapeake which constituted the comparison group for this study are described below. The schools are numbered six through ten for the purpose of reporting data. Chesapeake spends \$4731 per pupil with no specific figure available for the elementary level student. The principals included two males and three females. The per pupil ratio of administrators to students was one to 346.6.

None of the Chesapeake Schools included in this study have a Chapter One Program. One intermediate school is in the third year of an inclusion pilot program for special education. The principal indicated that ITBS scores had not changed for the gifted or regular students included in this pilot over the three-year period. This same school won the intermediate level PTA volunteer hours contest with 8,497 hours of work provided to the school by parents in the 1992-93 school year.

Racial mixes ranged from a low of 6.1% black to a high of 53.5% black students (see Table 4). The lowest percentage of free lunch students was 5.6 while the highest percentage of free lunch students was 20.8. The average number of students on free lunch was 64.2. The number of gifted students ranged from a low of 8% to a high of 16%. Figures for the individual schools are listed in Table 4.

Two of the buildings are relatively new, less than five years old, while three are 43, 37, and 32 years old. One of the three older schools was remodeled extensively with an addition included two years ago.

Summary of School Characteristics

When comparing the two school systems used in this study, the Portsmouth schools had higher percentages of black students, students receiving free lunch, students identified as gifted, and a lower percentage of students

Table 4

School Characteristics for Chesapeake

School	Black	White	Free Lunch		Reduced Lunch	Year Occupied	Size	Special Ed	Gifted
			Lunch	Lunch					
Six	6.1%	91.3%	5.6%	1.8%	1958	762	14.5%	11.9%	
Seven	53.5%	44.9%	20.8%	4.8%	1963	579	9.4%	8.0%	
Eight	6.1%	92.2%	3.8%	2.4%	1991	1001	10.9%	15.7%	
Nine	20.6%	73.9%	8.9%	3.6%	1991	679	5.4%	12.9%	
Ten	11.9%	87.4%	8.5%	2.7%	1952	677	16.1%	12.6%	

identified as special education than Chesapeake. School one, for example, was 87% black and had 83.7% of its school population on free lunches. Additionally, the administrator-student ratio was similar for both school systems.

The quantitative aspects of this study have been described in this chapter, as well as descriptive information that provides additional means to evaluate the implementation of and impact of TQM on an urban elementary school. The data analysis for this study follows.

Chapter IV

Results

The results of this quantitative study are described herein. In this chapter, the results pertaining to the hypotheses are discussed followed by the descriptive component. The first hypothesis deals with the student scores on the Iowa Test of Basic Skills reading comprehension and total mathematics scores. Hypothesis two deals with the teacher scores on the High PERFORMing Team Instrument.

Hypothesis One

The subjects used to test hypothesis one were third grade students in Chesapeake and Portsmouth in 1991. The Portsmouth students attended the schools that used TQM in an effort to improve Iowa Test of Basic Skills scores.

Means for each school's 1991 and 1993 reading and mathematics components are presented in Table 5. The schools were matched based on yielding the closest total scores for the third grade test in both mathematics and reading for two different schools from two school systems. Schools one through five are from Portsmouth and schools six through ten are from Chesapeake. The difference in the schools that were matched indicates a range from 3.7 points to an exact match. Five Portsmouth schools were higher initially and four Chesapeake schools were higher initially.

Table 5

Matched School Means

School	Reading	Mathematics	Reading	Mathematics
	1991	1991	1993	1993
One	95.5	96.5	130.3	130.5
Seven	94.7	97.0	120.9	123.7
Two	102.3	99.8	123.3	131.1
Eight	102.3	100.6	133.2	128.1
Three	104.7	109.4	138.7	137.0
Six	104.2	108.2	134.7	130.0
Four	102.3	103.5	137.3	136.5
Ten	105.0	104.3	131.9	131.7
Five	107.8	107.1	129.3	130.1
Nine	108.2	106.5	129.4	133.0
<u>Totals</u>				
Portsmouth	102.0	103.1	131.9	133.2
Chesapeake	102.6	103.1	130.1	129.1

The 1993 scores showed differences ranging from a high of 9.9 to a low of .1. The mean mathematics difference was 5.76 and the average reading difference was 4.9. Seven of the ten means were higher for the Portsmouth schools while only three were higher for the Chesapeake schools.

Totals for each school system are also included in Table 5. Both systems' scores in reading are 2.0 and 2.6 points higher than the national average for 1991 reading and 3.1 for 1991 mathematics. By 1993, Portsmouth is 8.1 points higher in reading while Chesapeake is 6.1 points higher. In mathematics, Portsmouth is 9.2 points higher than the national average. Chesapeake is 5.1 points higher.

The overall 1991 scores from Portsmouth were slightly lower (by 0.6) than Chesapeake in reading, but in 1993 the Portsmouth scores are 1.9 points higher. While starting with the same scores in mathematics, Portsmouth exceeds Chesapeake by 4.1 points in 1993.

Hypothesis one states that there will be a difference in the mean Iowa Test of Basic Skills scores in reading comprehension and total mathematics between urban schools using total quality management and urban schools not using total quality management. The results of the MANOVA comparing systems are presented in Table 6. The MANOVA comparing the school systems was not significant, $\Lambda = 0.968$, $p = .103$; however, the mathematics scores were significantly higher, $F(2, 139) = 4.09$, $p < .045$. Hypothesis one is partially accepted.

Table 6

MANOVA Comparing System Scores

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Reading ^a				
Between	1	122.70	122.70	.54
Within	140	31755.27	226.82	
Total	141	31877.97		
Mathematics				
Between	1	604.57	604.57	4.09*
Within	140	20712.70	147.95	
Total	141	21317.27		

^a*N* = 142**p* < .05

In testing the individual pairs of schools, school one from Portsmouth was significantly higher than the school to which it was matched, $\Lambda = .787$, $p = .039$. A significant difference was also found between the reading scores of the two schools in that pair (see Table 7). The results of the MANOVA comparing school eight from Chesapeake to school two was significant, $\Lambda = 0.768$, $p < .029$, favoring the Chesapeake school. Neither the reading nor the mathematics category was significantly different.

Table 7

MANOVA Results Comparing ITBS Scores

	<i>df</i>	<i>MS</i>	<i>F</i>
Reading			
Portsmouth x Chesapeake	2	122.7	0.54
One x Seven	28	662.70	6.31*
Two x Eight	28	730.13	2.64
Three x Six	28	120.00	0.53
Four x Ten	28	213.33	1.18
Five x Nine	20	0.05	0.00
Mathematics			
Portsmouth x Chesapeake	2	604.6	4.09*
One x Seven	28	353.63	3.88
Two x Eight	28	67.50	0.40
Three x Six	28	367.50	2.40
Four x Ten	28	168.03	1.25
Five x Nine	20	43.68	0.22

Note. $n = 15$ for individual schools except Five and Nine

where $n = 11$. $N = 71$

* $p < .05$

When comparing difference scores for the ITBS between the two school systems, the MANOVA indicated a significant difference, $\Lambda = 0.936$, $p < .01$, with the mathematics scores again resulting in a significant difference favoring the Portsmouth Schools, $F(2, 139) = 9.17$, $P < .01$ (see Table 8). The reading scores were not significantly different (see Table 8).

Table 8

MANOVA Comparing System Difference Scores

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Reading ^a				
Between	1	201.13	201.13	1.37
Within	140	20556.08	146.83	
Total	141	20757.21		
Mathematics				
Between	1	638.04	638.04	4.09
Within	140	9745.77	69.61	
Total	141	10383.81		

^a*N* = 142

As Table 9 shows, two of the Portsmouth schools had significantly higher reading comprehension difference scores while three of the five Portsmouth schools had significantly higher total mathematics difference scores. The result from

one MANOVA indicated a Chesapeake school, eight, was significantly higher with the reading category also significantly higher (see Table 9). Four comparisons showed no results.

Table 9

MANOVA Results Comparing ITBS Difference Scores

	<i>df</i>	<i>MS</i>	<i>F</i>
Reading			
Portsmouth x Chesapeake	2	201.13	1.37
One x Seven	28	554.70	4.39*
Two x Eight ^a	28	634.80	5.13*
Three x Six	28	93.63	0.75
Four x Ten	28	483.03	5.74*
Five x Nine	20	0.73	0.00
Mathematics			
Portsmouth x Chesapeake	2	638.04	9.17*
One x Seven	28	410.70	6.72*
Two x Eight	28	120.00	1.85
Three x Six	28	246.53	4.44*
Four x Ten	28	224.13	5.75*
Five x Nine	20	65.63	0.60

Note. $n = 15$ for individual schools except Five and Nine where $n = 11$. $N = 71$.

^aChesapeake school higher

* $p < .05$

In order to compare the individual school system's means to the entire population's score, a standard score was computed. Specifically, a Z score was computed and converted to percentiles for reading and mathematics. The results in reading indicated a third grade percentile of 56 for the TQM system and 59 for the non-TQM system. By the fifth grade reading test, the TQM system achieved at the 74th percentile while the non-TQM system was at the 70th percentile. Thus, while both systems showed improvement in reading, the TQM system improved 18 percentiles and the non-TQM system only 11 percentiles.

As with the reading scores, the results of the comparison for mathematics scores showed improvement for both systems. The TQM system improved from the 60th to the 77th percentile resulting in a 17 percentiles gain. The non-TQM system improved 6 percentiles progressing from the 60th to the 66th percentile.

The *t*-test comparing the age of the Portsmouth sample to the Chesapeake sample showed no significant difference, $t(140) = .046$, $p < .963$ (see Table 10). The two samples were almost equal in age. Also, the chi-square performed to compare gender composition of the Portsmouth and Chesapeake samples were not significantly different, $\chi^2(4, N = 142) = 0.462$, $p < .610$ (see Table 11).

Table 10

T-test for Age Comparison

Group ^a	<u>M</u>	<u>SD</u>	<u>t</u>
Portsmouth	130.704	5.788	-0.046
Chesapeake	130.746	5.261	

^aN = 142

Table 11

Chi-Square Test for Gender Comparison

Group ^a	Observed	Expected	χ^2
Portsmouth Male	28	30	0.462
Female	43	41	
Chesapeake Male	32	30	
Female	39	41	

^aN = 142

Hypothesis Two

A significant value, $\Lambda = 0.87$, $p = .0097$ was obtained for the total score on the High PERFORMing Team instrument. In running the Tukey's post hoc test on the seven subcategories, no significant F values were found (see Table 12).

Table 12

MANOVA for High PERFORMing Team Instrument

Category	<i>df</i>	<i>MS</i>	<i>F</i>
Purpose	1	23.35	3.55**
Empowerment	1	.40	0.07
Relationships and Communication	1	1.71	0.14
Flexibility	1	2.71	0.3
Optimal Productivity	1	8.60	1.22
Recognition and Appreciation	1	1.14	0.10
Morale	1	18.76	2.01
Total	101	0.73	2.85*

Note. $N = 103$

* $p < .05$ ** $p < .1$

Hypothesis two states there will be a difference in mean scores on the subcategory of teacher purpose, empowerment, relationships and communication, flexibility, optimal productivity, recognition and appreciation, and

morale as well as the total mean scores between urban schools using total quality management and urban schools not using total quality management. The hypothesis is partially accepted.

Descriptive Component

The questions from part two of the survey (see Appendix A) were compiled by each school, with system totals provided where appropriate. Additionally, descriptions of the school improvement team meetings are provided with a description of the artifacts found during the review.

In responding to the question concerning whether the SIT was working, there were 40 affirmative responses to this question, with one qualified. The one qualification indicated that the administration does not always allow the teams to succeed. There were no negative responses to this question. While the survey asked why, none of the respondents indicated why the teams were working.

In response to the question on working collaboratively to deal with the school's most important academic priorities, 40 team members indicated they were dealing with the most important problems. One respondent felt the team did not always focus on the most important problem. Test scores, writing predictors, monitoring forms, surveys, brainstorming, attendance statistics, checklists, and IEPs (individualized educational plan) for the lower quartile

have been used to supply the data to determine which priorities should be addressed. Responding SIT members, 43, felt progress was being made toward achieving school goals.

In response to the question regarding what is working to help the school meet its most important goals, team members listed many different items, with few receiving more than one vote (see Appendix H). Items listed by the respondents which related to TQM techniques included brainstorming, the PDSA Cycle, prioritizing success strategies, constant monitoring the plan, the SIT and team building equaling 11 votes. Brainstorming received four votes. Other items included prioritizing success strategies, fewer F's, inclusion, and Montessori. Two items with more than one vote were attendance strategies, with three votes, and increasing parental contacts, with two votes. Reading strategies mentioned were writing rubric, reading every afternoon for 15 minutes, writing club and writing contests, tutoring, word of the day, daily writing, and reading across the curriculum. The total vote for reading categories was nine. Mathematics manipulatives and mathematics timed tests were helping schools to reach goals according to respondents and received four total votes. Writing strategies included writing skills, writing strategies, writing clubs and contests, writing rubric and daily writing. There were 13 responses for these items combined. Categories affecting

teaching in the school were team teaching, cooperative learning, inclusion, IEPs for the lower quartile, Montessori and presenting various topics via staff development sessions. Tutoring was listed and would cover reading, writing and mathematics.

Efforts that were not achieving success listed by a few respondents were Write on Willingly, WOW, with three responses, and word of the day/week, with three responses. The only other effort that received more than one response was attendance, with three responses. Improved cooperation and communication, in conjunction with 100% commitment and effort from all, were suggested as the means for achieving goals by two respondents. This blends with a third respondent's call for increased cooperation while following the plan. Reducing the number of goals per year to allow for adequate planning and focus by the group was seen as important. Another SIT member felt the group should continue to try new methods, a response that contradicted another member's feelings that the SIT was not working. Attendance was seen as an area where efforts were not working by three members. Additionally, according to one member, having a chair and co-chair with no experience was not working. A final team member felt mathematics scores had not improved enough.

In order to do better, checking the data to determine

needs, building on what we have been doing, working together better and continuing to try new methods were indicated by three respondents each. Limiting paper work was also suggested by three respondents. Two responses each were tallied in the areas of continuing to problem solve, focusing on goals, involving parents, and trying not to do too much. Other responses by individuals were to improve mathematics, keep encouraging, keep problem solving, accept shared decision making responsibilities and reduce class size. Additional suggestions were to add an assistant principal, protect planning time, follow through and be consistent. One respondent suggested improvement would result from letting the teachers teach, while another respondent encouraged the stabilizing of faculty turnover that resulted from the Montessori program.

The administration was perceived as participatory by team members. Four principals were classified as participatory with one principal receiving one response of participatory and one response of autocratic. One principal received three autocratic votes and 12 participatory votes. Principals also regularly attend SIT meetings as well as other administrators according to respondents.

The individual SIT members indicated that their training had occurred anytime from the summer of 1990 through the fall of 1993. Six people indicated that they had

no training. One person indicated that no Portsmouth training had been completed but that Navy training had occurred.

Table 13 lists the totals for TQM tools in which SIT members indicated they had been trained and were comfortable using. Twenty-three SIT members indicated they were comfortable using the interactive skills process, and 33 indicated they were comfortable using problem solving skills. Only five people felt capable of using the pareto chart with three people indicating a comfort level in using the control chart. Twenty-eight respondents were comfortable using the fishbone analysis. Respondents were slightly more confident using the check sheet, with 12 indicating they were comfortable using the tool and 17 indicating comfort with the bar chart. Eighteen SIT members were comfortable using the pie chart and seventeen the flow chart.

As Table 13 indicates, the training given in using TQM tools during the four-day session does not translate into a comfort level for the trainee to use the tools. Tools such as the interactive skills process and the problem solving process which were introduced early in the training translated to higher comfort levels for use.

Experience in education for SIT members ranged from two to 28 years, with an average of 13.3 years. Several members

Table 13

Training and Comfort Level with TOM Tools

TQM Tool		School					total
		1	2	3	4	5	
Interactive Skills Process	O ^a	2	13	3	4	8	30
	C ^b	1	12	2	3	5	23
Problem Solving Process	O	5	15	4	4	9	37
	C	4	15	3	2	9	33
The Pareto Chart	O	2	6	2		6	16
	C		3			2	5
The Fishbone Analysis	O	3	14	4	4	9	34
	C	3	13	3	1	8	28
The Control Chart	O	1	3	1		5	10
	C		1			2	3
The Check Sheet	O	2	11	2	1	6	22
	C	1	7		1	3	12
The Bar Chart	O	2	9	2	1	6	20
	C	2	7	2	1	5	17
The Pie Chart	O	2	7	2	1	6	18
	C	2	8	2	1	5	18
Flow Charting	O	3	10	3	4	6	26
	C	1	9	1	1	5	17

^aO = training occurred ^bC = comfortable using

indicated that they were rotating off the team after three years or were changing positions on the team.

In summary, comments made on the survey general were of a positive nature with team members approving of the process used by the School Improvement Teams. Negative responses were limited to three respondents.

School Improvement Team Meetings and Artifact Reviews

School One Meeting Review.

Topic areas were introduced by various committee members. The conversation was directed to the principal in many instances. The principal was very successful in redirecting focus to the other 12 team members present. Parental participation was solicited on one issue, but the consensus reached resulted in a different solution than the parents suggested. Participation by members was evident.

School One Artifact Review.

The school should be commended for keeping an excellent notebook that includes charts showing the ITBS scores by category for each grade level. The Montessori program is competing for the National Productivity and Quality Award. Brainstorming sessions were scheduled with parents, interested teachers, the director of the TQM program, and three other administrators. Topics for brainstorming were volunteer mentoring, parental monitoring, conflict resolution, in-school suspension, reading comprehension,

mathematics, attendance and physical education. Teachers were urged to view each child as an individual, and greet each student at the door by the SIT. A need for a schoolwide discipline plan that is consistent for all students, as well as schoolwide rewards that are consistent, were acknowledged by the SIT.

School Two Meeting Review.

A variety of topics concerning improving writing and reading were discussed by the 22 members present. The program Write on Willingly, WOW, has resulted in positive parental feedback. The SIT agreed that a survey of the faculty should be performed to gain teacher input. A summer reading workshop for parents, developing handouts to aid parents in assisting their children, and encouraging students to read a book a month were suggested by members. The possibility of video taping a child reading was offered as a solution.

Survey results were presented at the meeting indicated a positive outlook by the faculty concerning mathematics manipulatives. A workshop was scheduled for using calculators in class. The BEAM Program, Be Excited About Mathematics, was mentioned as a possibility for continuing improvement in mathematics.

School Two Artifact Review.

A fishbone analysis of staff climate was developed from

a survey of the faculty at the meeting selected for review. Ten strategies were developed for the faculty to improve climate.

The tutoring program for reading and vocabulary evaluation sheet was presented to the SIT for teacher input. The means for improving the reading and vocabulary program were listed resulting in 13 strategies.

Parent conference day was supported by the SIT as a beneficial activity. The group suggested the faculty go to one neighborhood for conferences and provide busses for parents from two other areas.

School Three Meeting Review.

The SIT discussed several topics related to student criteria that would indicate a readiness to progress from one grade to another and criteria for inclusion grouping. A better means of scheduling below grade level readers in an effort to reduce pull out time was agreed upon by the eight member group.

A faculty retreat for the purpose of presenting collaborative learning techniques was discussed. The group's survey of the faculty indicated some resistance to the idea as presented. The group brainstormed some solutions that resulted in a proposal for a day retreat, to be held at a hotel in the city to alleviate child care problems for the faculty and support the local businesses.

The possibility of a faculty salad bar and earlier bus arrivals were dismissed as topics for discussion by the SIT. The central school administration handles these topics. Also, the need for improving student behavior in class was acknowledged; however, methods for improving were not discussed.

School Three Artifact Review.

School three also maintains a notebook to preserve artifacts from previous meetings. The review of the selected month revealed a fishbone was developed for increasing parental involvement. Also, at the meeting the rehearsal of the Working Smarter Together Presentation on Collaboration took place.

School Four Meeting Review.

Team co-chairs were attending a program on TQM. The meeting was led by the principal. There were seven members present.

A survey of the faculty on the previous meeting's brainstorming ideas had been conducted since the last meeting. Strategies for reading by grade level were discussed by the group. Making video tapes of the children retelling stories that they had read and developing listening centers, were two suggestions for third grade. Flip chart compilations of the ideas were posted by grade level.

There was some discussion of the possibility of using Reading Recovery techniques throughout the school. This idea was to be further investigated.

Ideas generated for mathematics included having a mathematics minute, journal, peer tutoring, word problem of the week, and having middle and high school tutors. These ideas would be taken back to the grade level teams for discussion.

The group consensus was that one goal per grade level in reading and mathematics would be developed for the annual plan. The group also recognized the need for the ITBS score's arrival so that decisions would be data driven.

School Four Artifact Review.

School four had no artifacts available for review. It was agreed that a second meeting would be observed and the date was scheduled. The meeting was canceled and an emergency meeting scheduled without notifying the researcher. A third meeting was scheduled and canceled during the last week of June.

School Five Meeting Review.

School five was focusing on improving attendance and discussing the conflict mediation program the school was considering for adoption. The Josten's Learning Center was also discussed as a possible project for the 1994-95 school year.

Brainstorming, consensus building, the interactive skills process and recognition were TQM techniques used during the meeting. There were 12 members present at the meeting in addition to the representative from the central administration staff. The school was a finalist for the US Senate Quality Award.

School Five Artifact Review.

The review of school five indicated that benchmarking of attendance had occurred and that a fishbone had been developed for the safe and orderly dismissal of school. A brainstorming session yielded suggestions such as providing certificates to thank parents for getting their children to school and maintaining a six-week perfect attendance bulletin board with student pictures. The brainstorming session for safe and orderly dismissal provided the two bell release suggestion that would let primary students out first and intermediate students out second. Another suggestion was that students would be encouraged to walk to the right in the halls.

A survey of the faculty was used to determine the academic and maintenance recommendations for the SIT to make to the school system in budgeting for the following year. Another item related to the 1994-95 school year that was discussed at the meeting was block scheduling. The SIT decided to use block scheduling for the intermediate level

in order to improve testing skills.

Evaluation of Meeting Guidelines

Additionally, meeting guidelines provided by Portsmouth were used to evaluate the SIT meetings. Table 14 displays the guidelines and whether the guidelines were met by each school. Schools one and two met all guidelines within the SIT members control. While school four began the meeting late, due to a transportation emergency beyond their control, all other guidelines were met. While breaking the 100 mile rule, the rule of common sense and legality that requires students to be supervised was met. School five's SIT members met all guidelines but the one dealing with interruptions. For school three, several members were late despite the late start of the meeting. Also, one member left early. Agenda topics were covered, some twice, and in a varying order. One topic was not addressed due to a team member's absence.

Table 14

Quality Meeting Guidelines Evaluation

School	One	Two	Three	Four	Five
Participants are punctual.					
	yes	yes	no	yes	yes
Meetings start at the specified time.					
	yes	yes	no	no	yes
Meetings are uninterrupted.					
	yes	yes	no	yes	no
Participants listen actively.					
	yes	yes	yes	yes	yes
There are no one-to-one conversations.					
	yes	yes	yes	yes	yes
There is active participation.					
	yes	yes	yes	yes	yes
Participants are willing to reach consensus.					
	yes	yes	yes	yes	yes
Participants share responsibility for team's progress.					
	yes	yes	yes	yes	yes
There is freedom to check progress and ground rules.					
	yes	yes	yes	yes	yes
Participants respect the agenda.					
	yes	yes	no	yes	yes
Timekeeping is observed.					
	yes	yes	yes	yes	yes
Central administration represented.					
	no	no	no	no	yes

The SITs did use system meeting guidelines and TQM tools at their meetings. The artifacts from previous years were maintained and available at four schools. The fifth school had the current year's artifacts. Treatment fidelity was strong.

Cuban believes, "To evaluate the effectiveness of such complex organizations as schools solely on the basis of a percentile rank is little better than to judge a car's quality solely on its miles per gallon or a hospital's effectiveness" (p. 151). As Georgiades indicates, "Effectiveness should be measured in terms of the instructional goals of the schools" (1984, p. 17). The TQM process allows schools to develop goals that can be achieved within the year. Portsmouth School System is implementing a process that evaluates whether the school meets its annual goals.

Chapter V

Discussion

Business leaders in the United States began the transition to the Deming philosophy of participatory management and data driven continuous improvement after the airing of *If Japan Can, Why Can't We?* (1980). This National Broadcasting Corporation documentary attributed Japan's postwar economic success to the Deming philosophy. While the implementation of TQM in the business sector has had mixed results (Main, 1994), educators are embracing TQM nonetheless. Will the change in management from autocratic to TQM participatory improve climate as Andrews, Centofante, & Orr (1987); Burns (1990), and Wilcox (1993) claim; and, will such a change in management improve student achievement as Gezi (1990), Mentel (1883), and Thierbach-Schnieder (1984) claim?

The student achievement section of this study was designed as a quasi-experimental study using a pretest-posttest with a nonequivalent control group. For the teacher section of the study, a posttest only design using a nonequivalent control group was used. The purpose of the study was to determine if the model presented in Figure 1, page 8, is a true representation of TQM's impact on student achievement. Does increased participation in decision making yield improved teacher purpose, empowerment, relationships

and communication, flexibility, optimal performance, recognition and appreciation, and morale which then improve student achievement in reading comprehension and mathematics?

The review of the literature indicates that employees are not working to full potential. The introduction of a participatory management style increased employee commitment and creative problem solving in business settings. O'Looney (1993) indicates lack of commitment by teachers contributes to poor student performance. Would similar results occur in an urban elementary educational setting utilizing TQM?

This current study is not of an experimental nature, and therefore does not claim causality, but seeks to fill a void in the existing research on participatory management in an educational setting.

Hypotheses and Findings

Hypothesis One

Does TQM improve student achievement in reading and mathematics? In order to answer this question, the Iowa Test of Basic Skills was used to measure student achievement in this segment of this study. For the student achievement portion of the study, subjects were 71 fifth graders from five Portsmouth schools using TQM and 71 fifth graders from five Chesapeake schools not using TQM ($N = 142$). The Portsmouth students were randomly selected from school Iowa

Test of Basic Skills score sheets. Student attendance in the same school was verified and scores for third and fifth grade recorded. Chesapeake students were selected from third grade school lists matching ITBS scores with the Portsmouth students by school. A *t*-test was used to verify no initial significant difference existed between subjects from the two school systems. A MANOVA was used to analyze the data with a Tukey's post hoc following significant *F* results.

Additionally, the individual schools from each system with matching student groups were compared via a MANOVA with Tukey's post hoc used where appropriate. Difference scores, which were computed for mathematics and reading, were compared using a MANOVA. The Tukey's post hoc was again used following a significant *F*.

Hypothesis one asserts that there would be a difference in the mean Iowa Test of Basic Skills scores in reading comprehension and total mathematics between urban schools using total quality management and urban schools not using total quality management. The MANOVA comparing ITBS student scores was not significant, $\Lambda = 0.968$, $p = .103$. However, the student mathematics scores for the TQM schools were significantly higher with $F(2, 139) = 4.09$, $p = .045$. Hypothesis one is partially accepted.

When difference scores were compared, the TQM schools were significantly higher, $\Lambda = 0.936$, $p < .01$. The

mathematics difference scores were again significantly higher for the TQM schools, $F(2, 139) = 9.17, p < .01$.

The improvement in mathematics was expected due to the introduction of mathematics manipulatives in several schools. This TQM initiative combined with the TQM mathematics programs would be expected to yield an upward trend in student mathematics achievement.

Student reading achievement was also expected to increase significantly as a result of TQM initiatives. Surprisingly, this was not the case.

The Portsmouth students showed an increase from 2.0 and 3.1 to 8.1 and 9.2 over the national average in reading and mathematics respectively. Chesapeake students showed a smaller increase from 2.6 and 3.1 to 6.1 and 5.1 in reading and mathematics respectively.

The student samples from the two school systems did not differ significantly in age as compared using a *t*-test. Likewise, the chi-square test showed no significant difference in gender composition of the samples from the two systems.

When individual schools were compared, Portsmouth had two schools significantly higher in reading difference scores and one school higher on the total reading score. Three schools from Portsmouth were significantly higher in mathematics difference scores. One school from Chesapeake

was significantly higher in reading difference scores.

Hypothesis Two

The second segment of this study sought to determine if using TQM in schools would improve teacher purpose, empowerment, relationships and communication, flexibility, optimal productivity, recognition and appreciation, and morale as measured by the HPTS. For the High PERFORMing Team Survey, the School Improvement Teams' from the five Portsmouth schools were used and those persons who would be selected by the principal to serve on such a team were used in the five Chesapeake schools. Scores were compared using a MANOVA followed by a Tukey's post hoc.

Hypothesis two states that there would be a difference in mean scores on the sub-categories of teacher purpose, empowerment, relationships and communication, flexibility, optimal productivity, recognition and appreciation, and morale as well as the total mean scores between urban schools using total quality management and urban schools not using total quality management. While the MANOVA was significant, $\Lambda = 0.87$, $p = .0097$, the Tukey's post hoc resulted in no significant F values for the seven teacher characteristics to the previously set alpha level of .05. Hypothesis two is also particularly accepted. Teacher purpose was significant to the .1 level, but again alpha was set at .05.

While a significant difference was expected on the High PERFORMing Team Survey, the review of the literature certainly would have led one to expect a significant increase in the sub-categories of morale, purpose, and empowerment also. Therefore, having none of the specific sub-categories result in a significant difference between TQM and non-TQM schools was not an expected finding.

Descriptive Summary

In order to provide additional information concerning the use of TQM in the schools used in this study, site visits were made, artifacts were reviewed, and additional questions were added to the HPTS. The key findings from the six questions recommended by Schmoker and Wilson (1993) and included in the survey of the School Improvement Teams are as follows (see Appendix A):

1. The School Improvement Team members overwhelmingly indicated that they support the process and rate their principals as participatory leaders who support their efforts.
2. The reading areas and mathematics areas have been and continue to be targeted for improvement by the SITs of all five schools.
3. Attendance and discipline need to be targeted for improvement in the coming year.
4. More training in the TQM tools which members are

uncomfortable using needs to be provided, and all new members need to be trained before serving on the SIT (see Appendix H).

5. The principals demonstrated the ability to accept differing opinions from SIT members and to redirect questions to other team members in an effort to increase involvement.
6. The TQM instructional improvement decisions are data driven.
7. The SITs in all five schools represent the entire range in years of teaching experience.
8. Portsmouth spent \$369 more per student than Chesapeake.
9. The SIT members overwhelmingly felt the most important issues in the schools were being addressed by the teams.

Additional findings and observations by the researcher while attending meetings and reviewing artifacts include the following:

1. Teams that were larger than 15 members did not have time for input from all members.
2. Teams that had fewer than nine members had noticeable pauses when brainstorming.
3. The amount of time required for correct use of TQM tools and reaching consensus at meeting deters

teacher involvement. Release time from teaching is needed for teachers to reduce the overtime required of individuals who participate on the SITs.

4. Teachers need to be more committed to the SIT solutions.

Limitations

This study was a quasi-experimental design. Causality cannot be claimed. A major concern for this study was the lack of experimental control over the schools used. Another major concern was the fact that schools from two different systems were compared. Since objectives tested by the ITBS for fifth grade (see Appendix I) are very specific in nature, and since both school systems use these objectives to determine curriculum content for reading and mathematics, the resulting curriculums are very similar. Also, both school systems have high student transfer rates between and within systems. Therefore, similarity in the curriculums is beneficial to both school systems. Finally, teachers and administrators from one school system transfer to the other and the majority of teachers and administrators in both systems are trained by the local universities.

In order to reduce initial differences between the students samples, the student population in this study from Portsmouth was matched with the student population from

Chesapeake. The average scores for the Portsmouth sample were 102.0 for reading and 103.1 for mathematics. Using matching to select the Chesapeake sample (102.6 reading; 103.1 mathematics) would indicate the two samples performed at slightly above the national mean of 100 in both areas. School one from Portsmouth had reading and mathematics scores below the national mean, but performed significantly higher in difference reading and mathematics scores and significantly higher in overall reading scores than the school to which it was matched.

Concerns with the external validity issues which need to be addressed included novelty. Novelty, the fact that there is change in the schools, is a possible threat to the external validity of this study. New ideas are continually implemented through the use of the TQM tools such as brainstorming and the PDSA Cycle. The new ideas and different methods may not continue to show improvement with continued use.

Teachers participating on the SITs are receiving more attention from the central administration and from the site administration. The Portsmouth School System is also receiving more attention from the Virginia Department of Education, DOE. The grant awarded to Portsmouth Schools comes with legal responsibilities to assure appropriate spending. The Hawthorne effect is a possible source of

confounding as participants perform differently due to the increased attention from the business sector, the DOE, the media, the Senate, and the central school administration.

Initially Portsmouth Schools applied to the DOE for the grant with 25 other school divisions thus indicating an interest in TQM. The DOE conducted site visits and conducted interviews before the grant was awarded. Selection by the DOE based on the information gathered seeking six school systems which would be successful with implementing TQM. Therefore, the Portsmouth teachers, administrators, parents and students may have had a predisposition toward TQM-participatory management. This would result in the interaction of selection and treatment yielding another external validity issue.

Other events which occurred during the time of the treatment may have had an effect on the results of this study. This is referred to as history, which would be an internal validity issue. Many other events may have occurred over the two-year period covered by this study. One example of an event which may have had an effect on the TQM system was the superintendent's statement regarding the need to have a 10% increase in ITBS scores. Another example of history in the TQM system would be the downsizing of the system, leading to staff reductions which may have evoked increased teacher effort.

Internal validity issues would include differential selection, since the Portsmouth teachers and site administrators may have differed from the Chesapeake teachers and site administrators initially. The schools selected for this study were selected for their exceptional transition to TQM, increasing the confounding possible from selection. The students involved in the study may have also differed initially, as parents may have decided to live in one city rather than another based on the reputation of the different school systems.

Another internal validity issue would be differential loss of students. Students who were not present from the third through the fifth grade at the same school were not included in this study. Students change schools and school systems for a variety of reasons, including expulsion, living with a different guardian, and moving to a different location inside or outside the same system. If the students eliminated from the study were those students who responded negatively to the TQM initiatives, then differential loss of students from the Portsmouth sample could have affected the results. Several students whose names were drawn but eliminated from the Portsmouth sample simply moved from one TQM school to another TQM school. Similarly, during the matching process to locate the Chesapeake sample, several students simply moved from one non-TQM school to another

non-TQM school. No subjects eliminated from the Portsmouth sample appeared in the Chesapeake schools used for this study.

In addition to the internal and external issues, error variance resulting from preexisting individual differences among subjects was possible. Additionally, while the HPTS had a high reliability rating, the possibility of measurement error cannot be eliminated. Two factors which were not likely to contribute to variance were environmental factors and differential treatment. Environmental factors for the ITBS administration are addressed in the test administration booklet which discusses heat, light, noise and student comfort. For the SITs, the individual members choose where and when to complete the survey. Finally, there was no differential treatment by the researcher, since the researcher had no contact with student subjects or test administrators.

Generalizability

Cuban (1984) states, "Junior and senior high schools are organizationally and culturally quite different from the lower grades" (p. 132). The findings are not generalizable to the upper levels, however, this study, in this researcher's opinion, is generalizable to other urban elementary schools.

Future Research

The size of the student sample was admittedly small. The transient nature of the military clientele was a contributing factor. The national trend toward smaller elementary schools was also a factor and may prevent this study from being replicated with a larger student sample.

It would have been preferable to have all members of the SITs used in this study attend the same training session, but this did not occur. While much of the training session is standardized by tape and workbook activities, trainer enthusiasm and vocabulary could have caused different levels of understanding of the TQM tools.

For testing the teacher purpose, empowerment, relationships and communication, flexibility, optimal performance, recognition and appreciation, and morale, the size of the sample was also too small. The SITs lost teacher members due to pregnancy and illness, and lost parent members who were assigned to ships at sea. Future research on teacher characteristics using the High PERFORMing Team instrument, should include the entire faculty. Surveying the entire faculty would determine if positive effects on the HPTS are evident throughout the faculty or only among the SITs.

Team members indicated on the survey the need for more commitment from the rest of teachers in the school. Hansen

(1991) suggests that brainstorming must be used by all participants, thus all teachers. Perhaps having more participatory groups working on different issues would increase faculty commitment as opposed to only the SIT members being committed to SIT initiated programs. Since all teachers affect learning outcomes, all teachers need to deal with instructional issues.

Future research which focuses on the number of faculty members participating in each school's management, and correlating that number with the level of commitment to change in the school and student outcomes, would provide useful insight.

Bringing about change in the classroom is a difficult task. Teachers generally work independently. Staff development activities presented to improve instruction are often ignored or adapted by teachers (Corbett, 1983). While Lawler (1990) indicated hierarchical leaders had difficulty instituting change, Whitaker (1995) found principals who use participatory management were more successful in promoting change. Covey (1991) also states commitment is related to involvement. Covey recommends rating decisions on a 10 point scale and multiplying by *commitment* to the decision, also rated on a 10 point scale. The resulting effectiveness factor on issues related to spending, new programs, staffing, and other instructional issues could be correlated

with the ability of the leader to accept differing opinions (Stern, 1992), faculty climate, and student outcomes in TQM schools as opposed to non-TQM schools.

Ideally, designing an experimental study, with schools from the same school division serving as experimental and control groups for students and teachers, would provide evidence to support or refute the transition to TQM. Repeating this study using an experimental design would be desirable. Future research should be performed by selecting two schools from the same school district and assigning the treatment, TQM, to one school and continuing autocratic management in the other. Programs implemented via the TQM process could be autocratically dictated to the other school. The results could then be compared, eliminating many confounding variables.

Further research on the impact of TQM on schools is needed. While this study covered the first three years, a study of the long term effects (five to ten years) of TQM on school improvement would be beneficial. Do difference scores on the ITBS continue to increase in schools managed by TQM? Do ITBS scores continue to improve? A longitudinal study that looks at difference scores over a period of time would provide useful information on the impact of TQM on student achievement. Again, a longitudinal study is recommended to determine if TQM schools continue to show improvement in

reading comprehension and mathematics?

Other aspects of student achievement could also be evaluated in the future. In looking at alternative measures of student achievement, the SITs would have to use the data generated by these measures to initiate instructional improvement.

Do scores on the HPTS increase with continued use of TQM in the schools? While the characteristics measured by the High PERFORMing Team survey were higher for the TQM schools in this study, an experimental design is needed to determine causality.

Conclusions

While not claiming causality, the results of this research indicate that the use of TQM may be related to increased growth over a two year-period for the student mathematics scores and higher HPTS scores. By contributing to the information available on TQM, this research takes a small step toward the evaluation of TQM in the schools.

Based on the research findings and the review of the related literature, this researcher draws the following conclusions.

In order to increase the participation in the total quality management process, the school system should restructure the day to allow for more teacher and parental involvement in the process. On SIT meeting days, the school

would release students three hours earlier. Teachers would use this time to attend committee meetings, to work with TQM tools and to attend SIT meetings. Substitute teachers could also be used to provide team members with additional time to complete TQM related tasks. Release time is a necessity for the teachers to guarantee long-term commitment to the process. The responses from SIT chairs and teachers during site visits indicated the need for more time to complete SIT work.

At only one meeting was the assigned central administration person present. A type of monitoring via central office assignments to the site teams needs to be implemented to insure that the principal is not impeding the progress of the school improvement teams. This presence from central administration would facilitate the progress of the schools toward a participatory style when there is opposition by a principal. Additionally, the questions regarding areas handled by the administration from the central office could be addressed by this representative. The representative could also make an effort to eliminate the bureaucratic block which hinders many improvement efforts.

As Chamley, McFarlane, Young and Caprio (1992) recommend, team members are gathering information through inquiry and the teams are making free and informed choices.

Survey respondents indicated that helping individuals to become committed to the SIT's solutions needs to be improved in the school system (see Appendix H). Increased involvement by all school employees is the key to improved commitment (Whitaker, 1995).

Team members must feel comfortable using all TQM tools. Continued training in the use of TQM tools as recommended by Vogt and Hunt (1988) must be made available to the teams. When new members are selected, training must be given prior to the start of the school term.

SITs work best when the total number of members is between 12 and 15. When teams are larger than 15, time for input by all members is limited. Smaller teams of less than 12 tend to have members overloaded with paperwork and fewer creative solutions suggested during meetings.

Since the TQM schools, with more disadvantaged students, are showing these favorable results, the process used seems to be producing, directly or indirectly, these results. While all the tools of TQM may not have been used in each school, the training of faculty members continues and various TQM tools are being used to find solutions to problems. The artifacts reviewed and meetings attended by the researcher show an effort toward the correct use of TQM tools and its philosophy. The SITs were involved in making management decisions that affected the various instructional

programs in the schools. The introduction of various new programs such as Write On Willingly (WOW), and the use of mathematics manipulatives were an outgrowth of the SITs efforts. The decisions made by the SITs were data driven and directed toward the improvement of instruction in the individual schools. SITs rated principals as participatory. Portsmouth has been recognized by the United States Senate for the use of the TQM philosophy in its school system.

Admittedly, the Herculean effort put forth by the teachers in the participating TQM schools has caused this improvement. Teachers and administrators were in the buildings very early and very late working on developing plans that would yield improvement. This increased employee effort was expected in relation to a participatory management style, as indicated by the review of the literature related.

The Portsmouth schools are considered more urban and more disadvantaged than the Chesapeake schools, yet the Portsmouth schools improved 18 and 17 percentiles in mathematics and reading. Chesapeake improved only 11 and 6 percentiles in mathematics and reading. Are these increases practically important enough to justify the increased spending on the TQM transition? While one would have to believe any school board or parent would be pleased with the improvement in scores, whether or not the public is willing

to pay the price for a quality education remains an unanswered question at this point.

As Schenkat (1992) points out, the schools must be evaluated based on meeting goals which the schools are setting in several areas. This research indicates the mathematics goals are being met. As the transition to TQM continues, more goals are expected to be met since, as Deming indicated, such a transition will take five years or more.

While future research will increase the confidence with which total quality management is recommended, TQM is recommended by this researcher. TQM appears to have had a positive impact on the schools used in this study after a few years. Improvement in mathematics mean and difference scores are shown in this study. The overall score on HPTS was also higher for the TQM schools. Unfortunately, reading scores were not significantly higher after two years. It had been expected that they would have improved. Both hypotheses were partially accepted. Major change in an urban setting is difficult; however, TQM seems to have provided the momentum to yield positive change in the urban setting. Strong support should be given to total quality management until more data indicate otherwise.

References

- Anders, L. W., Centofante, E. F., & Orr, J. T. (1987).
Building the instructional team for effective
leadership. *NASSP Bulletin*, 71(502), 61-63.
- Bailey, S. M. (1992). *The AAUW report: How schools
shortchange girls*. Washington, DC: The American
Association of University Women.
- Beckner, W. (1990). The why and how--commitment and
leadership. *NASSP Bulletin*, 74(529), 4-10.
- Bennis, W. (1984). The 4 competencies of leadership.
Training and Development Journal, 38(8), 15-19.
- Bernd, M. (1992). Shared decision making requires effective
instructional leadership. *NASSP Bulletin*, 76(540), 64-69.
- Blanchard, K., Carew, D., & Parisis-Carew, E. (1990). *The
one minute manager builds high performing teams*. New
York, NY: William Morrow and Company, Inc.
- Bloom, B. S. (1976). *Human characteristics and school
learning*. New York, NY: McGraw-Hill.
- Bonstingl, J. J. (1992a). The quality revolution in
Education. *Educational Leadership*, 50(3), 4-9.
- Bonstingl, J. J. (1992b). *Schools of quality: An
introduction to total quality management in education*.
Reston, VA: Association for Supervision and Curriculum
Development.
- Bonstingl, J. J. (1992c). The total quality classroom.

- Educational Leadership*, 49(6), 67.
- Bonstingl, J. J. (1993). The quality movement: What's it really about. *Educational Leadership*, 51(1), 66.
- Borg, W. R. & Gall, M. D. (1989). *Educational research: An introduction* (5th ed.). New York: Longman.
- Bowers, D. G., & Seashore, S. E. (1966). Predicting organizational effectiveness with a four-factor theory of leadership. *Administrative Science Quarterly*, 2(2), 238-263.
- Brassard, M. (1992). *The memory jogger™ for education*. Methuen, MA: Goal/QPC.
- Broadinsky, B. (1928). *Building morale: Motivating staff*. Arlington, VA: American Association of School Administrators.
- Buckman, J. & Shape-Burk, Z. (1992). *The partners for quality education initiative report*. St. Paul, MN: Minnesota Academic Excellence Foundation.
- Buffie, E. G. (1989). *Elementary principal series no. 1: The principal and leadership*. Blomington, IN: Phi Delta Kappa Educational Foundation.
- Burns, P. J., Jr. (1990) *Teacher morale as related to the perceived administrative leadership style of principals in selected group IV schools in the state of New Jersey*. (Doctoral Dissertation, Seton Hall University, 1990). ProQuest Dissertation Abstracts AAC, 9025853.

- Carmine, E. G. & Zeller, R. A. (1979). *Reliability and validity assessment*. Newbury Park, CA: Sage Publications.
- Chamley, J. D., McFarlane, F. R., Young, R. L., & Caprio, E. M. (1992). Overcoming the superprincipal complex: Shared and informed decision making. *NASSP Bulletin*, 76(540), 1-7.
- Chance, P. (1989). Great experiments in team chemistry. *Across the Board*, 26(5), 18-25.
- Cherry, M. (1991). School ownership--the essential foundation of restructuring. *NASSP Bulletin*, 75(537), 33-39.
- Chubb, J. E., & Moe, T. M. (1990). *Politics, markets, and America's schools*. Washington, DC: The Brookings Institution.
- Corbett, H. D. (1983). Staff interdependence in school change. *Educational Administration Quarterly*, 48(8), 30-31.
- Cuban, L. (1984). Transforming the frog into a prince: Effective schools research, policy, and practice at the district level. *Harvard Educational Review*, 54(2), 129-151.
- Deming, W. E. (1993). *The new economics for industry, government, education*. Cambridge, MA: Massachusetts Institute of Technology Center for Advanced Engineering Study.

- Deming, W. E. (1993, October). Management today and tomorrow: How it must change. Symposium conducted in Richmond, Virginia.
- Deming, W. E. (1986). *Out of the crisis*. Cambridge, MA: Massachusetts Institute of Technology Center for Advanced Engineering Study.
- Donmoyer, R. & Wagstaff, J. G. (1990). Principals can be effective managers and instructional leaders. *NASSP Bulletin*, 74(525), 20-29.
- Duke, D. L., Showers, B. K. & Imber, M. (1980). Teachers and shared decision making: The costs and benefits of involvement. *Educational Administration Quarterly*, 16(1), 93-106.
- Dunham, R. B. (1984). *Organizational behavior*. Homewood, IL: Richard D. Irwin, Inc.
- Fiedler, F. (1986). *New approaches to effective leadership*. New York, NY: Academic Press.
- Fields, J. C. (1993). *Total quality for schools: A suggestion for American education*. Milwaukee, WI: Quality Press.
- For children's sake: The Comer school development program* (1991). New Haven, CN: Yale Child Study Center.
- Franke, R. & Kaul, J. (1978). The Hawthorne experiments: First statistical interpretations. *American Sociological Review*, 43(5), 333-359.

- Freeston, K. R. (1992). Getting started with TQM. *Educational Leadership*, 50(3), 10-13.
- Georgiades, W. (1984). Administrative teams. In J. W. Keefe & Jenkins, J. M. (Eds.), *Instructional leadership handbook* (p. 160). Reston: National Association of Secondary School Principals.
- Gezi, K. (1990). The role of leadership in inner-city schools. *Educational Research Quarterly*, 12(4), 4-11.
- Gray, K. (1993). Why we will lose: Taylorism in America's high schools. *Phi Delta Kappan*, 74(5), 370-374.
- Guetzow, E. R. (1991) *Personal values and leadership styles of elementary school principles and effective school correlates*. (Doctoral Dissertation, University of Houston, 1991). *ProQuest Dissertation Abstracts*, AAC, 9129582.
- Guthrie, J. W. (1986). School-based management: The next needed reform. *Phi Delta Kappan*, 68(40), 305-309.
- Hansen, J. M. (1991). Site-based management and quality circles: A natural combination. *NASSP Bulletin*, 74(528), 100-103.
- Harris, G. K. (1989). Similarities between leadership characteristics of managers of successful business corporations and principals of schools cited for excellence. *Dissertations Abstracts International*, 51(01A).
- Hawley, D. (1985). The quality circle concept. *Principal*,

85(6), 41-43.

Hieronimus, A. N., Hoover, H. D., Lindquist, E. F., Oberley, K. R., Cantor, N. K., Eberly, S. S., Burbick, D. D., Bray, G. B., Schuchert, L. J., Lewis, J. C., Rattenborg, S. D., Hyde, E. L., Qualls-Payen, A. L., Martin, D. J., & Green, D. L. (1988) *Teacher's guide: Multilevel battery levels 9-14*. Chicago, IL: The Riverside Publishing Company.

Hieronimus, A. N., Hoover, H. D., Lindquist, E. F., Overley, K. R., Cantor, N. K., Eberly, S. S., Burbick, D. D., Bray, G. B., Shuchert, L. J., Lewis, J. C., Rattenborg, S. D., Hyde, E. L., & Qualis, A. L. (1986). *Iowa test of basic skills: Supplement to the teacher's guide*. Chicago, IL: The Riverside Publishing Company.

Hoes, D. G., Sr. (1993) An analysis of the principal's instructional leadership style and behavior as perceived by selected elementary school principals and teachers in the state of Maryland. (Doctoral Dissertation, University of Maryland, 1991). *ProQuest Dissertation Abstracts, AAC*, 9222795.

Holt, M. (1993). The educational consequences of W. Edwards Deming. *Phi Delta Kappan*, 50(3), 382-388.

Honeycutt, A. (1989). The key to effective quality circles. *Training & Development Journal*, 43(5), 81-84.

Hoy, W. K., Tarter, J. C., & Witkoskie, L. (1992). Faculty

- trust in colleagues: Linking the principal with school effectiveness. *Journal of Research and Development in Education*, 26(1), 38-45.
- Hughes, W. (1991). I learned my administration skills in kindergarten, but they made me go to graduate school anyway. *American Secondary Education*, 19(4), 28-9.
- Ingle, S. (1982). *Quality circles master guide: Increasing productivity with people power*. Englewood Cliffs, NJ: Printice Hall, Inc.
- If Japan can, why can't we? (1980). Chicago, Il: Films, inc.
- In search of excellence--a talk with Tom Peters about the principalship. (1988). *NASSP Bulletin*, 72(512), 36-45.
- Kerr, S., & Jermier, J. M. (1978). Substitutes for leadership: Their meaning and measurement. *Organizational Behavior and Human Performance*, 22, 375-403.
- Kohn, A. (1993a). The trouble with management models. *Education Leadership*, 51(1), p. 63.
- Kohn, A. (1993b). Turning learning into a business: Concerns about total quality. *Educational Leadership*, 51(1), 58-61.
- Lawler, III, E. E. (1990). The new plant revolution revisited. *Organizational Dynamics*. 19(2), 5-14.
- Lawler, III, E. E., & Mohrman, S. A. (1985). Quality circles after the fad. *Harvard Business Review*, 85(1), 65-71.

- Leatherman, R. W. (1992). *Quality leadership through empowerment: Standards of leadership behavior*. Amherst, MA: HRD Press Inc.
- Locke, E. A. (1986). *Generalizing from laboratory to field settings*. Washington: D.C: Heath and Company.
- Locke, E. A., Latham, G. P., & Schweiger, D. M. (1986). Participation in decision making: When should it be used? *Organizational Dynamics*, 14(3), 65-79.
- Lyles, C. (1995, June 24). A philosophy that is totally taking over the country. p. B1.
- Maeroff, G. I. (1993). Building teams to rebuild schools. *Phi Delta Kappan*, 74(7), 513-519.
- Main, J. (1984). The trouble with managing Japanese-style. *Fortune*, 109(7), 50-56.
- Meaney, D. P. (1991). Quest for quality. *California Technology Project Quarterly*, 2(2), 8-15.
- Mentell, E. J. (1993). Implementing site-based management: Overcoming the obstacles. *NASSP Bulletin*, 77(555), 97-102.
- Michaelsen, L. K., Watson, W. E., & Black, R. H. (1989). A realistic test of individual versus group consensus decision making. *Journal of Applied Psychology*, 74(5), 308-31.
- Milakovich, M. E. (1991). Total quality management in the public sector. *National Productivity Review*, 10(2), 195-213.

- Newman, C. B., & Diefenderfer, W. (1990). *Federal total quality management handbook: How to get started implementing total quality management*. Washington, DC: U.S. Government Printing Office.
- Norris, W. R., & Vecchio, R. P. (1992). Situational leadership theory: A replication. *Group and Organization Management, 17*(3), 331-342.
- Odden, E. R. & Wohlstetter, P. (1995). Making school based management work. *Educational Leadership, 52*(5), 32-36.
- O'Donnell, M., & O'Donnell, R. J. (1984). Quality circles--the latest fad or a real winner? *Business Horizons, 27*(3), 48-52.
- O'Looney, J. (1993). Redesigning the work of education. *Phi Delta Kappan, 74*(5), 375-381.
- Principals and leadership--an interview with John Gardner. (1988). *NASSP Bulletin, 72*(509), 70-78.
- Rothberg, R. A., & Pawlas, G. E. (1993). Leadership for restructured schools: What is necessary? *NASSP Bulletin, 77*(553), 70-76.
- Sasaki, N. & Hutchins, D. (1984). *The Japanese approach to product quality: Its applicability to the west*. Elmsford, NY: Pergamon Press.
- Saskin, M. (1988). Participative management is an ethical imperative. *Organizational Dynamics, 3*, 356-369.
- Savary, L. M. (1992). *Creating quality schools*. Arlington,

- VA: American Association of School Administrators.
- Schmoker, M., & Wilson, R. B. (1993). Transforming schools through total quality education. *Phi Delta Kappan*, 74(5), 389-395.
- Scholtes, P. R. (1988). *The team handbook: How to use teams to improve quality*. Wisconsin: Straus Printing Co.
- Schenkato, R. (1993). *Quality connections: Transforming schools through total quality management*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Seaman, D. F. (1981). *Working effectively with task-oriented groups*. New York: McGraw-Hill, Inc.
- Smither, R. D. (1991). The return of the authoritarian manager. *Training*, 28(11), 40-44.
- Spector, P. E. (1992). *Summated rating scale construction: An introduction*. Newbury Park, CA: Sage.
- Spindler, J. P., & George, P. S. (1984). Participatory leadership in the middle school. *The Clearing House*, 57(3), 293-5.
- Steel, R. P. & Lloyd, R. F. (1988). Cognitive, affective, and behavioral outcomes of participation in quality circles: Conceptual and empirical findings. *The Journal of Applied Behavioral Science*, 24(1), 1-17.
- Stern, A. L. (1992). Why good managers approve bad ideas. *Working Woman*, 17(5), 75, 104.
- Tang, T. L., Tollison, P. S. & Whiteside, H. D. (1987). The

- effect of quality circle initiation on motivation to attend quality circle meetings and on task performance. *Personnel Psychology*, 40(4), 799-814.
- Taylor, F. (1911). *The principles of scientific management*. New York, NY: Harper & Row.
- Thierbach-Schneider, G. (1984) Teacher involvement in decision making: Zones of acceptance, decision conditions, and job satisfaction. *Journal of Research and Development in Education*, 17(1), 25-32.
- Vecchio, R. P. (1987). Situational leadership theory: An examination of a prescriptive theory. *Journal of Applied Psychology*, 72(3), 444-451.
- Vogt, J. F. & Hunt, B. D. (1988) What really goes wrong with participative work groups? *Training and Development Journal*, 42(5), 96-100.
- Wellins, R. S., Bryham, W. C., & Wilson, J. M. (1991). *Empowered teams: Creating self-directed work groups that improve quality, productivity, and participation*. San Francisco, CA: Jossey-Bass Publishers.
- Whitaker, T. (1995). Informal teacher leadership--the key to successful change in the middle level school. *NASSP Bulletin*, 79(567), 76-86.
- Wilcox, H. D. (1993) The relationship between the teachers' perception of the high school principal's leadership style and the correlates job satisfaction and morale (teacher

- morale). (Doctoral Dissertation, The University of Akron, 1992). *Dissertation Abstracts International*, 53, 09.
- Yukl, G.O. (1981). *Leadership in organizations*. Englewood Cliffs, NJ: Printice-Hall.
- Zahara, S. A. (1982). An exploratory empirical assessment of quality circles. *Dissertation Abstracts International*, 43, 2030A.
- Zahara, S. A., Beebe, R. J., & Wiebe, F. (1985). Quality circles for school districts. *Educational Forum*, 49(3), 5-13.

APPENDIXES

Appendix A
Survey Instrument

Copyright Blanchard Family Institute, 125 State Place,
Escondido, CA 92029

Please rate the following items on a scale of one to five (1 = low; 5 =high). This survey is for the purpose of research only and strict anonymity will be maintained. Questions pertain to all administrators, teachers and support staff. Feel free to add any written statements on the back. Thank you for your time. Please return to me in the envelope provided at the School Improvement Meeting on _____ .

- _____1. The faculty can describe and is committed to a common purpose.
- _____2. Goals are clear, challenging and relevant to purpose.
- _____3. Strategies for achieving goals are clear.
- _____4. Individual roles are clear.
- _____5. The faculty feels a personal and collective sense of power.
- _____6. The faculty has access to necessary skills and sources.
- _____7. Policies and practices support school objectives.
- _____8. Mutual respect and willingness to help each other is evident.
- _____9. The faculty expresses themselves openly and honestly.

- _____10. Warmth, understanding and acceptance is expressed.
- _____11. The faculty listens actively to each other.
- _____12. Differences of opinion and perspective are valued.
- _____13. Members perform different roles and functions as needed.
- _____14. Members share responsibility for leadership and development.
- _____15. The faculty is adaptable to changing demands.
- _____16. Various ideas and approaches are explored.
- _____17. Output is high.
- _____18. Quality is excellent.
- _____19. Decision making is effective.
- _____20. Clear problem-solving process is apparent.
- _____21. Individual contributions are recognized and appreciated by the principal and other teachers.
- _____22. Faculty accomplishments are recognized by teachers.
- _____23. Faculty members feel respected.
- _____24. Individual contributions are valued and recognized by the organization.
- _____25. Individuals feel good about their membership on the faculty.
- _____26. Individuals are confident and motivated.

_____27. The faculty has a sense of pride and satisfaction about their work.

_____28. There is a strong sense of cohesion and school spirit.

Do you believe school improvement teams are working in your school? Why?

Are school employees working together collaboratively on the school's most pressing academic priorities?

What data have been used to determine these priorities?

Are we making progress toward the school's most important goals?

What is working?

What isn't?

How can we do better?

How many years in teaching and administration combined do you have?

Do you perceive your principal as autocratic or participatory in his/her leadership style?

Does your principal regularly attend your School Improvement Team meetings?

When did you complete your training in TQM (month, year)?

Please check the TQM tools in which you have received training:

- The Interactive Skills Process
- The Problem Solving Process
- Pareto Chart
- Fishbone Analysis--Cause and Effect
- Control Chart--Run Trend
- Check Sheet
- Bar Chart
- Pie Chart
- Flow Charting

Please check the TQM tools which you feel comfortable using.

- The Interactive Skills Process
- The Problem Solving Process
- Pareto Chart
- Fishbone Analysis--Cause and Effect
- Control Chart--Run Trend
- Check Sheet
- Bar Chart
- Pie Chart
- Flow Charting

With what topic areas has the School Improvement Team previously worked?

Appendix B
Blanchard Permission Letter

Blanchard Training and Development, Inc.



125 State Place
Escondido, CA 92029
619 489-5005

October 21, 1993

Ms. Ann Straus
OLD DOMINION UNIVERSITY
32 Colonial Way
Chesapeake, VA 23323

Dear Ms. Straus:

Blanchard Training and Development gives you permission to duplicate the "High Performing Teams Rating Form" to be included in your dissertation. We understand that this form will be included in your dissertation only. Please furnish one copy of your dissertation to Dr. Drea Zigarmi at the above address.

I wish you continued success in pursuing your degree.

Sincerely,

A handwritten signature in cursive script that reads "Kristine M. Aller".

Kristine M. Aller
Senior Account Manager

KA/lrm

Appendix C
PERFORM Instrument Information

Blanchard Training and Development, Inc.



125 State Place
Escondido, CA 92029
619 489-5005

TO: Ann Straus
FROM: Eunice Parisi-Carew *WPC*
DATE: October 25, 1993
RE: Background of the **PERFORM** Rating Scale

The **PERFORM** rating scale is based on the authors survey of the literature regarding the characteristics of High Performing Teams as well as informal research done with several of our client teams. Upon completion of our research, the authors categorized the results and created the acronym **PERFORM** to portray the elements. They then created leading questions under each of the categories which reflected key characteristics at each stage of group development. This instrument primarily is used as a dialogue tool by a group to uncover group issues.

I hope this helps.

/vag

Appendix D
Permission for Chesapeake Pilot

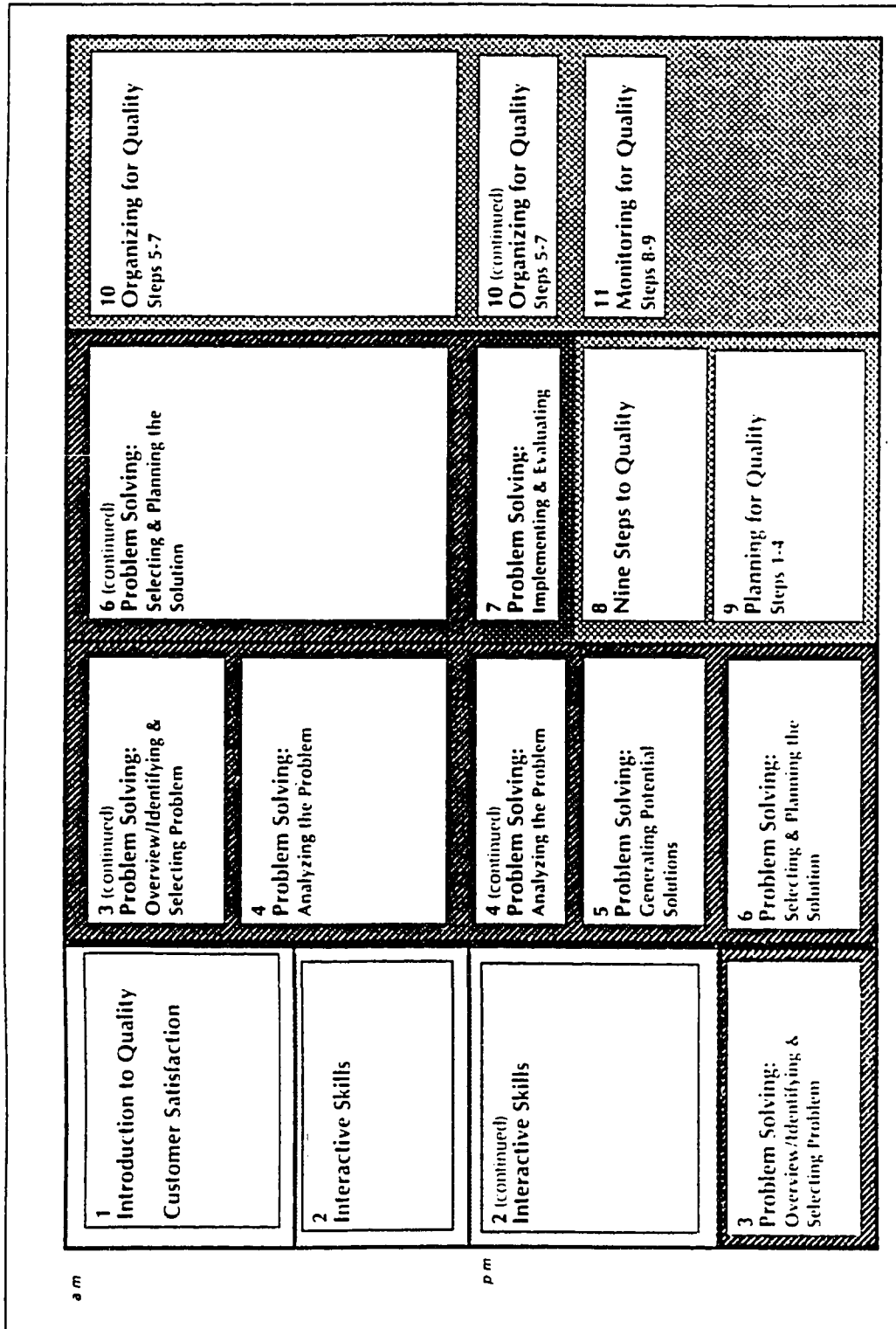
-

PLEASE NOTE

**Page(s) not included with original material
and unavailable from author or university.
Filmed as received.**

UMI

Appendix E
Portsmouth Training Schedule



Appendix F
Training Validation

.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

P. O. BOX 2120

RICHMOND 23216-2120

March 2, 1994

Ms. Ann Straus
32 Colonial Way
Chesapeake, Virginia 23325

RE: Portsmouth Public Schools Quality Training

Dear Ms. Straus:

I am writing to confirm Portsmouth Public Schools participation in the "Commitment to Quality" Partnership Program. This program is a partnership between the Virginia Department of Education, Xerox Corporation, and local school divisions in Virginia. The purpose of the partnership program is to translate Xerox's "Leadership through Quality" training into educational settings within the Commonwealth.

As such, Portsmouth Public Schools have identified selected personnel to become their Quality trainers. Under this model, to be certified as a Quality trainer, school personnel must first attend a four-day "Commitment to Quality" workshop and then attend the four-day "Commitment to Quality: Train-the-Trainer" session. Quality trainers are then observed to ensure that they are following the Quality training curriculum.

Portsmouth Public Schools Quality trainers are following the Quality training curriculum guide in their training sessions. The trainers continue to use the Quality materials and workbook as designed for this program. The delivery of the four-day workshop has been modified to accommodate school needs. This modification is acceptable and allowable within the construct of the partnership program since the integrity of the Quality curriculum modules has been maintained.

If I can be of further assistance, please contact me at 804/225-2737.

Sincerely

A handwritten signature in cursive script that reads "James C. Chancey, Jr." with a stylized flourish at the end.

James C. Chancey, Jr.
Grant Director

pc: Claude Parent

Appendix G

Portsmouth Participating Schools' Mission Statements

School One

The mission of the educational program at School One Elementary School is to develop each individual student intellectually, physically, socially, emotionally, and morally so he/she can reach his/her fullest potential and make a meaningful contribution to society. To implement this mission, our task is to involve the school staff, parents, and community and students in a cooperative spirit operating as an educational team.

School Two

The School Two Faculty and Staff accept the responsibility of providing an effective learning environment in which each student is expected to achieve self-discipline and mastery of academic skills. We promote aesthetics and physical development, appropriate values, and a positive attitude toward family, society, and country. We recognize the special contribution that parents, organizations, and others can make, and actively seek their cooperation in fulfilling our mission.

School Three

The staff, families and volunteers of School Three Elementary School accept the challenge to cooperatively teach, guide, and encourage all students to master the essential skills as they build on their yesterdays, maximize their todays, and plan their tomorrows.

School Four

The staff of School Four Elementary believe that all students can learn and succeed. Our school's focus will be building a strong foundation of essential skills, developing critical thinking and problem solving skills, developing attitudes of social awareness and civic responsibility and academic and cultural enrichment. We accept the responsibility to provide a positive environment for learning through discipline, encouragement, high expectations and promoting community support.

School Five

The staff of School Five Elementary School believes that it is our duty to prepare each student so that he can achieve mastery of essential skills and make a contribution to society. This mission will be accomplished by the cooperative efforts of the school, home and community. We believe that our school's purpose is to teach all students to the highest levels of performance while fostering positive growth in social and emotional behaviors and attitudes. We accept the responsibility of "teaching for Quality Learning for All Students."

Appendix H
Responses to Open Ended Questions on Survey

What data have been used to determine the priorities?	
attendance	3
sampling	1
surveys	12
team minutes	1
collective sharing	3
discipline logs	3
check sheet	2
test scores	9
report cards	2
teacher tests	1
grades	4
ITBS test	22
Literacy Passport Test	6
physical fitness tests	2
writing predictors	1
IEP	3
monitoring forms	3
school environment	1
rubric scoring for writing	2
OAP	3
observations	2
writing folders	1
workshops	1
end of book reading scores	1

criterion reference	1
MRT	1
SIP	1
grade level meetings	2
What is working (in regard to meeting goals)?	
administrative support	1
attendance	3
cooperative learning	1
fewer F's	1
IEP for lower quartile	1
inclusion	1
ITBS improvement plan	2
monitoring student progres	1
montessori	1
parental involvement and contacts	3
physical fitness activities	2
staff development	1
success strategies	1
team teaching	1
teaming	2
tests	1
tutoring	1
TQM Strategies	
SIT and Quality	1

the process of developing strategies	1
the Deming cycle	1
constant monitoring	1
brainstorming	2
prioritizing	1
sharing sessions	2
team building	1
working the plan	1
Mathematics	
mathematics manipulatives	3
mathematics timed tests	1
Reading	2
emphasizing in all subjects	1
15 minutes daily reading	1
reinforcement and strategies	2
comprehension practice	1
word of the day	2
Writing	
writing skills	1
writing strategies	3
writing club & contests	3
writing rubric	2
daily writing	4
What is not working (in regard to reaching goals)?	
attendance	3

chair and co-chair have no prior experience	1
improvement in mathematics scores	1
more parental involvement	1
need 100% support and commitment	1
need more communication and cooperation	1
poor discipline	1
SIT	1
teachers not cooperating and following the plan	1
too many goals for each area	1
word of the week	1
word of the day	2
Write on willingly	1
How can we do better?	
keep encouraging	1
improve mathematics	1
check data to determine needs	3
build on what we have been doing-revisit plans	3
keep problem solving	1
accept shared decision making opportunities	1
revisit plans	1
increase parental involvement	2
refining and redesigning	1
continue team planning	1
improve communication	1
protect planning time	1

focus on goals	2
reduce class size	1
let us teach	1
need an assistant principal for discipline	1
involve other teachers	1
stabalize faculty turnover caused by Montessori	1
trying to do to much	2
limit paperwork	3
consistency by all	1
work together better	3
follow through	1
keep trying new methods	3
Previous topics addressed by the SIT.	
Writing	6
reading	2
reading comprehension	25
mathematics	9
mathematics concepts	1
mathematics problem solving	1
Literacy Passport Testing	2
ITBS	2
testing	2
student attendance	2
self concept	1
vocabulary	2

	148
reduce referrals	2
communication and collaboration	1
student responsibility and behavior	2
consistency and compliance with school procedures	1
improve school's climate	8
parental involvement	8
attendance	6
physical fitness	2
OAP	1
conflict mediation	2
problem solving	4
morals	1
recess	1
bugeting	1
respecting differences	1
technology	1
cafeteriã noise	1

Appendix I
Iowa Test of Basic Skills Objectives



THE RIVERSIDE
PUBLISHING COMPANY

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test V: Vocabulary Level 11

The student selects a synonym for a past participle presented in context.

The student selects a brief definition for a noun presented in context.

The student selects the synonym for a noun presented in context.

The student selects a brief definition for a verb presented in context.

The student selects a synonym for a verb presented in context.

The student selects a brief definition for an adjective presented in context.

The student selects a synonym for an adverb presented in context.

The student selects a brief definition for an adverb presented in context.

The student selects a synonym for a noun presented in context.

The student selects a synonym for an adjective presented in context.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test R: Reading Comprehension Level 11

The student identifies an inferred cause of a given effect in a written passage.

The student selects the meaning of a multi-meaning word by using contextual clues.

The student recognizes a detail inferred in a written passage.

The student selects a classification for a prose passage.

The student selects the best title for a written passage.

The student recognizes the restatement of a detail in a written passage.

The student identifies the last event of a sequence in a written passage.

The student identifies an action which does not appear in a set of written directions.

The student recognizes synonymous terms in a written passage.

The student recalls a specific detail about setting from a written passage.

The student selects an inferred effect of an action in a written passage.

The student recognizes the author's purpose in one paragraph of a written passage.

The student recognizes a character trait in a written passage.

The student recognizes the author's main concern in a written passage.

The student identifies the first event of a sequence in a written passage.

The student recognizes the inferred reason for a character's emotion in a written passage.

The student recognizes an inference based upon a written passage.

The student recognizes the temporal relationship of two events in a written passage.

The student selects the literal meaning of a figurative statement.

The student recognizes a cause and effect relationship in a written passage.

Test R: Reading Comprehension, Level 11

- The student recognizes a cause and effect relationship in a written passage.
- The student identifies a character's action in a written passage.
- The student identifies the emotions of a character in a written passage.
- The student recognizes the emotions of a character inferred by the character's action in a written poem.
- The student selects a paraphrase of a sentence in a written passage.
- The student identifies the emotions of characters in a written passage.
- The student recognizes the main idea of a written passage.
- The student identifies a stylistic technique in a written passage.
- The student recognizes the author's purpose in a written passage.
- The student identifies the mood of a written poem.
- The student recognizes a summary of the details presented in one paragraph of a written passage.
- The student recognizes the sequential relationship of two actions in a written passage.
- The student recognizes an inference from a typographical clue in a written poem.
- The student recognizes the main idea of a paragraph in a written passage.
- The student recalls a specific detail in a written passage.
- The student recognizes the method used to develop mood in a written poem.
- The student recognizes the effect of a stylistic device in a written poem.
- The student recognizes the literal meaning of a figurative line in a written poem.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test L-1: Spelling Level 11

- The student recognizes correctly spelled words.
- The student chooses the misspelled word which has an unnecessary vowel.
- The student chooses the misspelled word which has a vowel omitted from the inflectional ending.
- The student chooses the misspelled word in which a consonant is omitted, preceding an inflectional ending.
- The student chooses the misspelled word which has an omitted silent consonant.
- The student chooses the misspelled word which has a consonant substitution.
- The student chooses the misspelled word in which a single consonant is substituted for a double consonant.
- The student chooses the misspelled word which has a vowel reversal.
- The student chooses the misspelled word which has an unnecessary consonant.
- The student chooses the misspelled word which has a vowel substitution.
- The student chooses the misspelled word in which a consonant is substituted for a vowel.
- The student recognizes the misspelled word which has an omitted vowel.
- The student chooses the misspelled word in which a consonant digraph is substituted for a variant consonant.
- The student recognizes the misspelled word which has a vowel reversal.
- The student chooses the misspelled word which has an omitted consonant.
- The student chooses the misspelled word in which a vowel and consonant are reversed.
- The student chooses the misspelled word which has a double consonant substituted for a single consonant.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test L-2: Capitalization Level 11

- In the context of a sentence, the student recognizes that the name of a person should be capitalized.
- The student recognizes that the first word of a sentence should be capitalized.
- In the context of a sentence, the student recognizes that the name of an organization should be capitalized.
- In the context of a sentence, the student recognizes a sentence with correct capitalization.
- In the context of a sentence, the student recognizes that the name of a weekday should be capitalized.
- The student recognizes that the title of a written work should be capitalized.
- In the context of a sentence, the student recognizes that a proper adjective should be capitalized.
- In the context of a sentence, the student recognizes that the name of a pet should be capitalized.
- In the context of a sentence, the student recognizes that the name of a street should be capitalized.
- In the context of a sentence, the student recognizes that the name of a country should be capitalized.
- The student recognizes that the closing of a letter should be capitalized.
- In the context of a sentence, the student recognizes that the name of a religious holiday should be capitalized.
- In the context of a sentence, the student recognizes that the name of a holiday should be capitalized.
- The student recognizes that the greeting of a letter should be capitalized.
- In the context of a sentence, the student recognizes that a person's title should be capitalized.
- In the context of a sentence, the student recognizes that the name of a month should be capitalized.
- In the context of a sentence, the student recognizes that the name of a city should be capitalized.

Test L-2: Capitalization, Level 11

In the context of a sentence, the student recognizes that the name of a company should be capitalized.

In the context of a sentence, the student recognizes that the name of a continent should be capitalized.

In the context of a sentence, the student recognizes that a common noun should not be capitalized.

In the context of a sentence, the student recognizes that the name of a racial group should be capitalized.

In the context of a sentence, the student recognizes that the name of a governmental agency should be capitalized.

In the context of a sentence, the student recognizes that the family name of a person should be capitalized.

In the context of a sentence, the student recognizes that the name of an ocean should be capitalized.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test L-4: Usage and Expression Level 11

The student selects an appropriate subordinate conjunction to fit within the context of a sentence.

The student recognizes a substandard spelling of a verb form.

The student recognizes faulty pronoun case.

The student recognizes the incorrect use of an article.

The student recognizes incorrect order of the first person pronoun in the object position.

The student recognizes a double negative.

The student recognizes faulty agreement of compound subject and verb.

The student recognizes an incorrect substitution for a helping verb.

The student recognizes a misspelled homonym.

The student recognizes faulty subject and verb agreement, due to an intervening phrase.

The student recognizes the incorrect form of a comparative adjective.

The student recognizes a grammatically correct sentence.

The student recognizes the incorrect past tense of an irregular verb.

The student recognizes faulty substitution of a pronoun for a demonstrative adjective.

The student recognizes incorrect substitution of possessive pronoun forms.

The student recognizes the incorrect past participle of an irregular verb.

The student recognizes the incorrect irregular plural of a noun.

The student recognizes an incorrect comparative adjective.

The student recognizes an example of substandard English.

The student chooses a topic sentence for a paragraph.

The student selects a verb with appropriate tense to fit within the context of a sentence.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test L-3: Punctuation Level 11

The student recognizes a correctly punctuated sentence.

The student recognizes that a declarative sentence ends with a period.

The student recognizes that an interrogative sentence ends with a question mark.

The student recognizes that an abbreviation is punctuated with a period.

The student recognizes that a direct quotation is punctuated with quotation marks.

The student recognizes that the closing of a letter is punctuated with a comma.

The student recognizes that the greeting of a friendly letter is punctuated with a comma.

The student recognizes that a city and state are separated by a comma.

The student recognizes that items in a series are separated with commas.

The student recognizes an unnecessary comma separating a noun and its modifying adjective.

The student recognizes that a date is punctuated internally with a comma.

The student recognizes an unnecessary question mark.

The student recognizes that an interjection is punctuated with an exclamation point.

The student recognizes that a contraction is punctuated with an apostrophe.

The student recognizes that a possessive noun is punctuated with an apostrophe.

The student recognizes unnecessary quotation marks.

The student recognizes that a direct quotation is separated from unquoted material by a comma.

The student recognizes an unnecessary comma between subject and verb.

Test L-4: Usage and Expression, Level 11

The student identifies the correct sequential placement for a sentence in a paragraph.

The student selects an appropriate verb form to fit within the context of a sentence.

The student selects the grammatically correct sentence (which contains neither a faulty pronoun reference nor a dangling modifier).

The student selects the sentence which does not belong in a paragraph.

The student selects a concluding sentence for a paragraph.

The student selects a passage which contains formal diction suitable for a business letter.

The student selects the complete sentence.

The student selects the sentence with the correctly positioned modifying phrase.

The student selects the sentence with correct word order.

The student selects the grammatically correct sentence (which is neither a run-on nor a fragment).

The student selects the concise sentence.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test W-2: Reference Materials Level 11

- The student selects a book chapter, appropriate for a specific research purpose, from a table of contents.
- The student chooses the page number on which a specific topic is located, using a cross reference in a book index.
- The student selects an encyclopedia volume which contains the key word in a multi-worded-research question.
- The student chooses the initial page number on which a specific topic is located, using a book index.
- The student selects the information likely to be included in a book chapter listed in a table of contents.
- The student selects a word containing the same vowel sound as a specified word, using a sample dictionary.
- The student chooses the page number on which a specific topic is located, using a subheading in a book index.
- The student identifies the number of syllables in a word, using a sample dictionary and pronunciation key.
- The student recognizes the relationship between two words presented in a sample dictionary.
- The student chooses a word to match a definition given by example, using a sample dictionary.
- The student identifies the sentence in which a word is used correctly, using a sample dictionary.
- The student recognizes a page number which two subjects share in common, using a book index.
- The student chooses a word which has a similar spelling and phonetic respelling, using a sample dictionary.
- The student identifies a misspelled word, using a sample dictionary.
- The student selects an encyclopedia volume which contains a key word inferred by specific examples.
- The student identifies which company name would be first in an alphabetical list.

Test W-1: Visual Materials, Level 11

The student identifies a generalization containing a comparison of two details presented on a graph.

The student recognizes a detail from a graph key.

The student identifies a relationship between two products, using a political map and map key.

The student determines which route intersects with a specified physical feature, using a map key and map.

The student selects a location on a map which matches a picture of that location.

The student identifies the nature of a route, using a map symbol and map.

The student determines the distance between two points, using a map key and map.

The student identifies the end of a route on a road map.

The student identifies the spatial relationship between two locations on a road map, using a map key and map.

The student selects a conclusion drawn from economic indicators presented on a political map.

The student selects the proper location of a road sign which indicates an intersection of two routes on a road map.

The student identifies the population of a specific location, using a map and a map key.

The student identifies the proper location for a directional sign on a road map.

The student recognizes an inference from a graph, using contextual and pictorial clues.

The student recognizes a summary of material from a graph, using a graph key.

The student identifies an occurrence which took place during a specified time period, presented in a graph.

The student chooses a time period for a specific occurrence, using a graph.

The student identifies an inference made from a political map and map key.

The student identifies a ratio presented in a graph.

The student recognizes a comparison based upon material presented in a graph.

The student identifies a generalization representing details from a graph.

The student selects the point at which two routes intersect on a road map.

Test W-2: Reference Materials, Level 11

The student selects an encyclopedia volume which contains the last name of a specified person, whose entire name is given.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the fourth letter.

The student chooses the periodical which would be the most appropriate resource for a specific research purpose.

The student recognizes the classification of a book from the book's title.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the third letter.

The student identifies the most appropriate resource for a specific research purpose.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the sixth letter.

The student identifies which proper name would be first in an alphabetical list.

The student identifies the function of a book glossary.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the fifth letter.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test M-1: Mathematics Concepts Level 11

The student selects the digital clock which shows a given number of minutes before the hour.

The student estimates products of two two-digit numbers.

The student selects the geometric shape which has a given fractional part shaded.

The student identifies the number which has a remainder when divided by a given number.

The student adds dollars and cents.

The student identifies the four-digit numeral having a specified digit in a given place.

The student selects the appropriate operation to solve a word problem.

The student identifies the number which makes a number sentence true.

The student chooses the operation which makes a number sentence true.

The student chooses the linear unit appropriate for measuring a given object.

The student identifies the pair of numbers which has a given sum and a given difference.

The student reads a thermometer.

The student identifies an expanded form for a given three-digit number.

The student identifies the number fact not belonging to a given family of facts.

The student chooses the pair of numbers which are both factors of a given number.

The student identifies the odd number which is a multiple of a given number.

The student counts the faces of a given solid.

The student measures a line segment to the nearest tenth of a centimeter.

The student determines the divisor of a division fact presented in equation form.

Test W-2: Reference Materials, Level 11

The student selects an encyclopedia volume which contains the last name of a specified person, whose entire name is given.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the fourth letter.

The student chooses the periodical which would be the most appropriate resource for a specific research purpose.

The student recognizes the classification of a book from the book's title.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the third letter.

The student identifies the most appropriate resource for a specific research purpose.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the sixth letter.

The student identifies which proper name would be first in an alphabetical list.

The student identifies the function of a book glossary.

The student identifies which word would be first in an alphabetical list, by alphabetizing to the fifth letter.

Test M-1: Mathematics Concepts, Level 11

The student determines how the total value of a five-digit numeral is affected by changing a specified digit.

The student selects the fraction greater than a given fraction.

The student determines the minuend of a subtraction problem involving three-digit numbers presented vertically.

The student selects the decimal numeral which equals a given decimal rounded to the nearest hundredth.

The student chooses the fraction equivalent to a given fraction.

The student identifies the shaded area equivalent to a given shaded area.

The student chooses the statement which describes the solution of a division equation when the dividend is a three-digit number and the divisor is a multiple of one-hundred.

The student selects the symbol which makes a given number sentence true.

The student selects the fraction with a given denominator.

The student determines which comparison of fractional numbers is false.

The student identifies the term matching a given description of two lines.

The student selects the number sentence for a given multi-step word problem requiring subtraction and multiplication.

The student chooses the fraction representing the part a given coin is of a dollar.

The student chooses the decimal numeral equivalent to the word name for a given decimal named as thousandths.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test M-2: Mathematics Problem Solving Level 11

The student solves a word problem requiring addition or multiplication of money amounts, information obtained from a chart.

The student solves a multi-step word problem requiring multiplication and subtraction of money amounts, information obtained from a chart.

The student solves a multi-step word problem requiring multiplication and addition of whole numbers.

The student solves a word problem requiring subtraction of money amounts, information obtained from a chart.

The student solves a multi-step word problem requiring multiplication and division of money amounts, information obtained from a chart.

The student solves a multi-step word problem requiring multiplication and division of whole numbers.

The student solves a word problem requiring subtraction of a whole number from a mixed number.

The student solves a word problem requiring multiplication of a two-digit number by a one-digit number, without regrouping.

The student solves a word problem requiring multiplication or repeated addition of money amounts, information obtained from a chart.

The student solves a word problem requiring subtraction of two-digit numbers, without regrouping.

The student solves a word problem requiring division of a two-digit number by a one-digit number.

The student solves a word problem requiring subtraction of a two-digit number from a three-digit number, without regrouping.

The student solves a multi-step word problem requiring addition and subtraction of whole number money amounts.

The student solves a word problem requiring subtraction of two-digit numbers, without regrouping and containing extraneous information.

The student solves a multi-step word problem requiring multiplication and addition of money amounts, information obtained from a chart.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Test M-3: Mathematics Computation Level 11

The student subtracts a two-digit number from a three-digit number, multiple regrouping required.

The student subtracts a one-digit number from a two-digit number, requiring regrouping and presented horizontally.

The student adds two three-digit numbers, without regrouping.

The student multiplies a two-digit number by a one-digit number, requiring regrouping and presented horizontally.

The student subtracts two-digit numbers, regrouping required.

The student subtracts two-digit numbers, without regrouping.

The student divides a two-digit number by a one-digit number, without a remainder.

The student recalls the quotient of a division fact presented horizontally.

The student adds two two-digit numbers, requiring regrouping.

The student subtracts two four-digit numbers, without regrouping.

The student adds three one-digit and two-digit addends, without regrouping and presented horizontally.

The student multiplies a three-digit number by a multiple of ten.

The student subtracts two three-digit numbers, requiring double regrouping.

The student adds two three-digit numbers, requiring regrouping of tens as hundreds.

The student divides a three-digit number by a one-digit number, without a remainder.

The student multiplies a one-digit number and a multiple of one-hundred presented horizontally.

The student multiplies a four-digit number by a one-digit number, regrouping required.

The student multiplies two multiples of ten.

Test M-3: Mathematics Computation, Level 11

- The student subtracts a three-digit number from a four-digit number, multiple regrouping required.
- The student adds a column of four two-digit and three-digit numbers, regrouping required.
- The student subtracts two three-digit numbers, regrouping hundreds as tens.
- The student divides a two-digit number by a one-digit number, with a remainder.
- The student adds two mixed decimals named as hundredths, regrouping required.
- The student subtracts fractions with like denominators, simplification not required.
- The student adds two two-digit numbers, regrouping tens as hundreds.
- The student subtracts two mixed numbers both named as hundredths, multiple regrouping required.
- The student adds a mixed decimal and a decimal both named as tenths, without regrouping and presented horizontally.
- The student adds two four-digit numbers, multiple regrouping required.
- The student divides a three-digit multiple of ten by a two-digit multiple of ten, without a remainder and presented horizontally.
- The student adds two mixed numbers with like denominators, simplification not required.
- The student multiplies two two-digit numbers, multiple regrouping required.
- The student subtracts a fraction from a whole number presented horizontally.
- The student multiplies a three-digit number by a two-digit number, regrouping required.
- The student divides a three-digit number by a two-digit number, without a remainder.
- The student subtracts a decimal from a mixed decimal both named as hundredths, without regrouping.
- The student adds two fractions with like denominators, answer expressed as a mixed number.

Skills Objectives
Iowa Tests of Basic Skills, Form H
Social Studies
Level II

- The student realizes the reason for a rule.
- The student recognizes that housing reflects life-style.
- The student identifies the choices in a decision making process.
- The student identifies a goal of early explorers.
- The student identifies the reason for public education.
- The student selects the purpose of a governmental branch.
- The student identifies a social problem caused by American western settlement.
- The student employs a time line to analyze a historical period.
- The student identifies the purpose of government.
- The student discriminates between urban and rural characteristics.
- The student recognizes the relationship between climate and housing.
- The student chooses a reason for conservation.
- The student selects a natural resource used by early American settlers.
- The student recognizes the relationship between agricultural resources and nutrition.
- The student identifies a reason for the establishment of international trade.
- The student recognizes a political term or concept.
- The student employs a time line to determine the major change during a historical period.
- The student recognizes an industrial change caused by modern technology.
- The student identifies a universal agricultural concern.
- The student identifies geographic characteristics of a region.
- The student recognizes the role of the family.
- The student identifies political cooperation.

Social Studies, Level 11

The student recognizes a reason for the historical establishment of separate governmental branches.

The student recognizes the purpose of taxation.

The student recognizes the prerequisites of starting a business.

The student identifies a challenge faced by the American states after gaining independence.

The student employs a time line to calculate time span.

The student employs a time line to determine the date of a specific event.

The student recognizes a power shared by local, state, and federal governments.

The student recognizes the interdependence of people within a culture.

The student recognizes the relationship between resources and production.

The student selects the requirements necessary for a transportation system.

The student identifies an effect of technology.

The student identifies a duty of an ecologist.

The student employs a time line to determine sequence of events.

The student recognizes powers of the federal government.

The student recognizes cultural diversity.

The student identifies a characteristic of a particular type of map.

The student identifies the concept of freedom of speech.

Skills Objectives

Iowa Tests of Basic Skills, Form H

Science Level 11

- The student identifies the plant structure having a given function.
- The student identifies a given simple machine.
- The student completes a given food chain.
- The student recalls the stages of digestion.
- The student identifies factors affecting the visibility of celestial bodies.
- The student recognizes a method of sterilization.
- The student identifies the function of a given organ.
- The student recognizes means to control flooding.
- The student identifies an appropriate first aid procedure.
- The student identifies characteristics of animal growth and development.
- The student understands the process of pollination.
- The student recognizes a method of soil conservation.
- The student defines a given health term.
- The student recalls types of weathering.
- The student recalls an effect of water pressure.
- The student identifies a capability of satellites.
- The student recognizes an example of condensation.
- The student recalls how scientists obtain information about other planets.
- The student identifies a means to increase friction.
- The student recalls a characteristic of the earth's surface.
- The student identifies the effect of protective coloring.
- The student identifies the most reliable way to obtain information about daily weather.
- The student recalls how an electric motor works.

Science, Level 11

The student identifies an example of a phase change.

The student identifies the physical condition necessary for a phase change to occur.

The student identifies safety rules intended to prevent poisoning.

The student identifies characteristics of social insects.

The student identifies the role of a given food in the diet.

The student identifies a source of electrical energy.

The student identifies the function of a given system of the body.

The student recalls a means of identifying an unknown substance.

The student identifies characteristics of weather phenomena.

The student identifies the basis for a given safety procedure.

The student recalls physical properties of a given substance.

The student recognizes an effect of the earth's rotation.

The student identifies a consequence of pollution.

The student identifies an example of instinctive behavior.

The student identifies a characteristic of heat energy.

The student identifies the reason for a given first aid procedure.