A COMPARISON STUDY OF STUDENTS' PERFORMANCE:
QUALITY/LEAD MANAGEMENT VERSUS BOSS MANAGEMENT STYLES IN
TECHNOLOGY EDUCATION

By

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ABSTRACT

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The purpose of this study is to compare two educational management

philosophies and their systems: boss/top-down management using stimulus-response, and

William Glasser's Quality School, employing W. Edwards Deming's Quality Control/

Lead Management. An experiment is done to determine whether students in the

experimental group demonstrate higher achievement levels at accomplishing class

objectives by using Choice Theory/Lead Management systems than in the control group

where the experimenter used the traditional classroom management approach of boss

management. Two similar home and auto classes are the subjects for the experiment.

The goal in the home and auto class is to provide students with valuable, practical

consumer information and the physical skills to perform simple construction, repair,

maintenance, and care for houses and automobiles. An informational pretest and posttest

are used to determine any differences in achievement between the two groups.

The final grades of the class members are included to add additional data to compare subject accomplishments.

Utilizing a two-tailed *t*-test with a .05 confidence level, it was determined that there is no significant difference in the overall performance of the home and auto classes using the two different approaches of classroom management. It would appear that different management systems are not a significant factor in academic success or failure when applied to a home and auto technology class.

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Introduction

Ideas and Definitions

Students today are immersed in the information age of lightning-fast connection to a myriad of facts, ideas, and examples, without a guide. The Internet is a portal to a world of virtual reality where the curious may surf in any direction, sans discernment, without a roadmap. Students can share files, thoughts, and conclusions with each other via e-mail, but they are self-directed and driven by the opinions of their peers, which is often informed solely by the popular culture.

While students race off into gigabytes of hyper-linked information, their teachers are grappling with a new student environment in a school management system designed before the invention of telecommunications to transfer information from the top down. Boss management, invented by industrialists who, themselves, were the product of an elitist education, mirrors the manufacturing systems of a bygone era. These systems, both educational and manufacturing, trained an isolated, illiterate population by rote, rather than creatively (Deming, 1986).

Boss management relies upon motivating via stimulus-response and coercion by reward and punishment. A majority of contemporary schools are managed with strict stimulus-response, punishment systems of boss management where students are coerced, either happily or unhappily, into compliance with the rules (Glasser, 1997).

Malcolm Knowles (1975) points out in his book, *Self-Directed Learning*, two distinct types of learning called *proactive* and *reactive* education. His statement, "It is a tragic fact that most of us only know how to be taught; we haven't learned how to learn" (p.14), points out the shortcomings of boss management educational systems. There is convincing evidence people who are self-directed (proactive learners) learn more, and learn better than students passively waiting for teacher-directed education (reactive learners) (Knowles, 1975). When students use self-directed Internet education, there are no teachers. The teachers acknowledge their own cyber-illiteracy, reinforcing the mantra of the wired generation: school is boring.

Lead, or Total Quality Management, developed by W. Edwards Deming, may accommodate the pioneer students of our information age. William Glasser has taken the ideas of Deming and applied them to a new system called Quality Schools. This approach purports to empower students through the use of choice theory. Unlike stimulus-response coercion, choice theory claims to build self-esteem, trust in teachers, and the realization of the need to do quality schoolwork. In a Quality School, the teachers show the students that the work they are being asked to do is meaningful, fulfilling the need for life-long skills. Teachers as well as administrators model the behaviors they require the students to emulate, teaching self-evaluation and the choosing of effective behavior. This is in stark contrast to the present method of boss management, which is controlling, with rules designed to manipulate students and to punish them with forced direction, berating, detention, expulsion, and blacklists. These methods develop a student's identity as either a successful rebel or a failure. Without

wise leadership, the student mantra grows: school sucks. The only challenge available is to make trouble.

Educators face frustration hourly within systems that rely on stimulus-response coercion. The age-old adage: *You can lead a horse to water but you can't make him drink*, is the perfect analogy to the present problems within public education's philosophy. If a horse is not thirsty, no matter how much stimulus-response is applied (yanking the rope to lower the horse's head, splashing water on its muzzle), the end result is a horse that is now more concerned for its well-being than an unwanted drink. Anger and frustration are applied for the desired result of forcing water down the throat of an animal that is not thirsty. Tie the horse up, drag it to the water, and physically throw the poor animal in; the horse is now terrified of drowning. In fury, the owner now drags the horse back to the stable, explaining to one and all that the animal is stupid. For punishment, the horse is left to stand alone in the stall until it gets good and thirsty. By nightfall, the owner returns, roughly ropes the horse, yanking it to the stream with a demand that the worthless beast drink and drink now. All the horse remembers is that the last time it was in this place, it almost drowned.

The problem of stimulus-response coercion used in most public schools today is similar: we can provide a place of learning, but we can't make the student think. The student has learned confusion, anger, and mistrust. This alienation can start at an early age. To coerce and punish a seven year-old with failure because she/he is not developmentally ready to read is devastating. A child's accumulation of perceived failures at school could develop phobias about reading - the main tool for self-directed education. Students don't understand what the trial and error process is all about when

fear of failure is what prohibits the student from being brave, strong-minded, and intelligent enough to try. Students are pitted against one another through the grading system, which is a program that punishes students who deviate from the expected norm. This is a top-down mentality, which reinforces non-creative, non-risk thinking, or people who question the system (Glasser, 1994).

A true example of quality management in education is in the extracurricular subject area of drama, where the student is left to create the performance: sing, speak, and choreograph, after directions are given. The only need is for a person to perform as best he/she can. Although there are as many practices as needed for perfection before rehearsal, no inspections are necessary to coerce the student, nor are grades essential to force compliance. All that is required is a pure need for quality and a positive self-image (Glasser, 1992). The creative student participant feels a natural motivation which promotes the thrill of dramatic performance. Yet in academic situations we find that over 50 percent of students are bored and unmotivated.

Glasser notes in his book *The Quality School* that students do think about quality, and have a good idea of how they can achieve it in school. The problem is that they only see quality in athletics, music, drama, art, and a few advanced placement classes, or in technology classes. Teachers educate for the tests; therefore, rote memory is often valued over creative thought. The goal of education is to prepare students for the corporate hiring force, and since corporations require more high technology, with a computer-trained workforce (not the apprenticed laborer of the early industrial revolution), it is difficult for the average to low average student to fit into instructional methods that are meant to prepare a select elite for further education past high school (Glasser, 1993). The

message being transmitted is that average students who struggle with pure, academic paper work should simply accept that others will inspect all their work without much input from them as to their struggle to understand the curricula. Therefore, the student only learns failure. Within the present educational milieu, we accept this and term it *beneficial* (Glasser, 1992).

It is time for change. Boss management will not produce the educational environment that is needed in the information age. It is difficult for educators using boss management to control the learning environment. Educational managers cannot build an adversarial, coercive system because there are so many instances where students can arrive at their own conclusions without guidance and leadership. Bossing through strict stimulus-response and coercive, adversarial ideology has forced confrontational exchanges between educators and their students. As Kantrowitz and Wingert (May 9, 1999) reported in *Newsweek*, this type of ideology could compel students to make heartbreaking, vengeful responses such as the one in Littleton, Colorado, or to tune out education all together. Littleton does not seem to have resulted from management-student interactions, but from student-student interactions. Students are learning, but what they are learning from each other is how to bully, threaten, and to wield absolute power. "Emory University psychologist Marshall Duke, an expert on children's friendships, recently asked 110 students in one of his classes if any of them had ever been threatened in high school. To his surprise, 'they all raised their hands'" (Kantrowitz & Wingert, 1999, p. 39). What are we really teaching in school? Could it be a response to the philosophy of management? In engines class, a student vents, "I hate this place! It is nothing more than a prison! Why do they think I will let them tell me how to live? No

one cares about me! I am out of here as soon as I am eighteen!" This student has developed a resistance to education.

Kantrowitz and Wingert (1999) state, "In middle adolescence, roughly the first three years of high school, teens are increasingly on their own. To a large degree, their lives revolve around school and their friends. 'They have a healthy sense of self,' says Steinberg (1999). They begin to develop a unique sense of identity, as well as their own values and beliefs. 'The danger in this time would be to try to force them to be something you want them to be, rather than help them be who they are'" (Kantrowitz & Wingert, 1999, p. 40).

There are an estimated five million capable, intelligent students in public education today who attend school regularly, but do not make an effort to become competent readers, writers, or problem solvers. The students' apparent lack of educational effort has, by the tender age of seventeen, basically eliminated their chances of leading even a minimally satisfying life (Glasser, 1997). They despise school, with all its meaningless homework and irrelevant information, which has nothing in common with their perceived world. These students perceive that coercion by the system has nothing to do with their real futures. The stimulus-response method of motivation has only accomplished a sense of forced compliance in the students. Forced compliance incites resistance in most educational experiences (Glasser, 1997). Resistance develops a sense of alienation that drives some students to the point of quitting school. "The individual and societal costs of dropping out have been well documented. According to recent estimates, each dropout represents an average loss of $58,930 in federal and state income taxes during the course of a lifetime. For the 3,881,000 dropouts between the

ages of 16 and 24 in the year 1991, this amounts to $228.7 billion in lost federal and state taxes over their lifetimes" (Imel, 1993).

In order to improve student performance in public education, one must understand the history of management philosophy as it is used in existing schools, and its effect on student achievement. The characteristics of two distinctly different management philosophies, Boss Management and Lead Management, will be defined.

Boss Management/Stimulus-Response Philosophy

Boss management has a rich and extended history. The system itself has been referred to as the *common sense* system, one of natural order, patterned after the clan or pack hierarchy. There is a boss to provide leadership, and subordinates to follow (Glasser, 1992). The original idea has numerous examples in nature; the wolf pack, mustang horse herds, chimpanzees, and lion prides are documented instances of hierarchical systems. In the group, each individual has a defined place or function in pursuit of survival. The animals are dominated by an all-powerful boss management system, which is concentrated in the chain of command.

As human beings evolved, many of the behavioral mechanisms that were inherent in natural selection played pivotal roles in the development of boss management. The strongest, the fastest, the smartest, and the most adaptive controlled the system or were the rulers, a right afforded them through dominant posturing in the group (Fuller, 1977). This management system began to break down for humans when natural selection was replaced with artificial barriers to entry. Monarchies were the first break from the natural selection, when lineage reduced the gene pool to a small sample of bloodlines.

Ownership of property and the feudalist structure furthered the entrenchment of power over the masses. Education based on social and economic class created a caste system that further reduced natural selection. The means of attainment society used to gain a basis of socioeconomic status was in opposition to potential or natural selection. This gave the ruling class a false sense of superiority. The ruling classes developed boss management as the only common sense philosophy capable of organizing a work force or sustaining a governing system (Marx, 1970).

The military structures of the world's great conquering armies are perfect examples of top-down management. In Tolstoy's *War and Peace*, the main character describes the shortcomings of selecting generals from the privileged class to lead the army; most were unrealistic incompetents and totally removed from the actual fighting. War for the leaders was a rite of passage, completely isolated from the resulting blunders that cost thousands of lives. Tolstoy revealed the greatest limitations of boss management: the leaders not understanding the true problems facing the managed army, and the time wasted in their search for others to blame for the blunders of battle plans (Tolstoy, 1967).

With the advent of the Industrial Revolution, boss management systems became established. Interchangeable parts demanded quality control. Quality inspection was introduced, and inspectors were added to the management system. Fredrick W. Taylor published his *Scientific Management Theory* in 1911, stating that factories were organized so that the workers did one small, repetitive task exactly as they were told. No deviations, thinking, or innovations were tolerated. Supervision with much direction was present. In the decade from 1910 to1920, the supervisory work force grew two and one

half times faster than the production work force. Taylor's system removed any responsibility for evaluation or innovation from the worker. Credit for a job well done was denied, and quality control was placed in the hands of supervisory management (Taylor, 1967). This effectively suppressed all creative and problem-solving incentives within the system.

Public educational management is today a boss management system. Public officials are calling for a standardized graduation or achievement test, to be certain that students have the minimum skills needed to enter the work force and function as citizens in a technological democracy. Tests are like industrial manufacturing inspections: they are designed to discover what has been done wrong, but they cannot reveal what is necessary to improve the system. Inspection does not produce quality. Tests cannot produce education. Inspection is only good at pointing out that there is a problem (Dobyns & Mason, 1994).

There are advantages to boss management in the specialized training of a work force. Responsibilities can be delegated to experts, the task can be streamlined to fit a norm that has been previously encountered, and on the basis of previous successes natural selection is made. A successfully boss-managed system eliminates the research time spent looking for quality from the workers, and accepting inventive, creative solutions that are already in practice. The expert's response to delegation of responsibilities about design function is the age-old question, "Why reinvent the wheel?" Who should engineer other than the engineers? Resources are protected through wise investments in strong leaders, who delegate jobs to workers who perform tasks, in a procedure that has been engineered to be the best.

Boss management is, when reduced to its essentials, a simple concept. There are four basic factors: (a) the boss setting the tasks and standards for the workers (students) without consulting them, with the workers adjusting to the job as the boss defines it; (b) the boss telling the workers how the work is to be accomplished, rarely asking for input from the worker; (c) the boss or inspector inspecting (grading) the work, with workers not involved in the quality control; (d) the boss using coercion in the form of punishment when the workers resist, thus creating a workplace where workers and supervisors are adversaries (Glasser, 1992).

Quality School/Total Quality Lead Management

Teachers are told through political mandates for education to *educate everyone*. We are in the Information Age. The problem is that we are asked to perform this feat with a philosophy of management that believes we must think for the student, tell him/her how to exist, and then inspect the results. There may be a better and more efficient way to manage. It is called Lead Management. Glasser (1992) has explained it well with eight examples of lead management versus boss management, taken from an unknown source:

1. A boss drives. A leader leads.

2. A boss relies on authority. A leader relies on cooperation.

3. A boss says "I." A leader says "We."

4. A boss creates fear. A leader creates confidence.

5. A boss knows how. A leader shows how.

6. A boss creates resentment. A leader breeds enthusiasm.

7. A boss fixes blame. A leader fixes mistakes.

8. A boss makes work drudgery. A leader makes work interesting (Glasser, 1992,

    p. xi).

The contrasting views of management represented in this list of bosses versus leaders

provide the cooperative flavor prevalent in lead or quality management. An overtone of

teamwork, problem solving, companionship, and working for a common cause are the

issues of Lead Management (Glasser, 1994). "'He who has never failed somewhere,'

Herman Melville wrote, 'that man can not be great'" (Dobyns & Mason, 1994, p. 6).

Lead Management theory states that stimulus-response and coercive punishment

produced a group of workers or students who would avoid experimenting, because even

small failures would result in spilled ink on their career copybook, something to be

avoided or denied at all costs. The biggest flaw in a boss management system is in not

allowing workers to be problem solvers, which is an important skill transmitted in

education (Dobyns & Mason, 1994).

   Total quality/lead management has been developing and functioning in Japan and

in Western Europe for the past fifty years; it has been largely ignored in the United

States, where it originated. The American industrial climate has not been conducive to

change, prior to the past decade. In the 1950's, the Allies had just won the war with an

incredible industrial war machine; the production quantities of war material that were

broadcast on the radio were thought to be impossible by the Axis. The Axis countries –

Germany, Italy, and Japan - made better planes, tanks, and armaments, but never came

close to manufacturing the sheer numbers produced by the United States. We were the

victors, and the industrial system that was in place was a major player in that tremendous

victory. There was no reason to change management style. The antithesis of continual improvement was the boss-management axiom: If it's not broke, don't fix it (Dobyns & Mason, 1994).

There were, however, a number of engineers and statisticians from this country who recognized the shortcomings that existed in boss management. They knew that the war had rallied the workers to production levels that were unrealistic for peacetime. As the war ended, so did the incentive to be productive. The system reverted to the pre-war labor/management discord that had been de-emphasized during the war years. The United States industrial complex was in fact ready to deliver goods and services to a world economy where there was very little competition. Boss management was the standard, and they felt that no change was needed (Dobyns & Mason, 1994). The United States was locked into a mindset.

Dobyns and Mason (1994) state, "American managers, by and large, don't know how to manage; not just in manufacturing, but in the service industry, in education, in health care, and in government at all levels. This is not because American managers are stupid, but because they are smart. They were taught how to manage in school, and by experience, they learned it better than anyone else in the world, and they don't want to give it up. They were taught; they learned; they are comfortable" (p. 1).

The unfortunate fact that present-day managers are missing is that things have really changed in the last 50 years. Technology is a perfect example. For instance, how many papers are written today with the use of computers? Is anyone typing out script on a manual typewriter? The benefit of this technological advancement is enormous. People can grasp technological improvement. They will go through the learning curve

even though they may wish they did not have to, because they can see the need (Dobyns & Mason, 1994). The biggest problem with management change is that, unlike technological change, there is not a product that can be held and looked at. Change in management is a change in thought; in this case, the change is from quantity to quality. This relates to the new paradigm of management philosophy in the world of today.

Historically, the idea of lead management was born in this country. The Japanese embraced the theory and have changed the management playing field. They have changed the focus from quantity to quality and the mindset from pleasing the boss to pleasing the customer. This new idea was born into an advanced world of thinking (Deming, 1986).

Empowerment, quality schools, and site-based management point in the same direction as lead management. This objective has the incentive of creativity, as shown in the previous extra-curricular examples. The common thread is Deming's philosophy of quality lead management. In lead management, persuasion, problem solving, and shared accomplishments are central. The lead manager spends all his time and energy facilitating the workers' productivity (Glasser, 1994). In Deming's (1992) words:

1. A manager is responsible for the consistency of purpose and the continuity to the organization. The manager is solely responsible to see that there is a future for the workers. It is our responsibility as a society to understand how this concept relates to better management of our schools, so that students receive and attain a high-quality education toward that better future.

2. The workers work in a system. The manager should work on the system to see that it produces the highest quality product at the lowest possible cost.

The distinction is critical. They work in the system; the manager works on the system. No one else is responsible for the system as a whole and improving it. This means that the administrators, much more than the teachers, are responsible for improving the system (Glasser, 1992, p. 31).

Deming's points about being a manager are described further in his four essential elements of lead managing:

1. The leader engages the worker in a discussion of the quality of the work to be done and the time needed to do it so that they have a chance to add their input. The leader makes a constant effort to fit the job to the skills and needs of the workers.

2. The leader (or a worker designated by the leader) shows or models the job so that the workers can see exactly what the manager expects. At the same time, the workers are continually asked for their input as to what they believe may be a better way.

3. The leader asks the workers to inspect or evaluate their own work for quality, with the understanding that the leader accepts that they know a great deal about how to produce high-quality work and will therefore listen to what they say.

4. The leader is a facilitator: he shows the workers that he has done everything possible to provide them with the best tools and workplace, as well as a non-coercive, non-adversarial atmosphere in which to do the job (Glasser, 1992, pp. 31-2).

Deming has given the world a blueprint for developing quality lead management, following a logical procedure with fourteen points:

1. Constancy of Purpose

2. Everybody Wins

3. Design Quality In

4. Don't Buy on Price Alone

5. Continuous Improvement

6. Training for Skills

7. Institute Leadership

8. Drive out Fear

9. Break down Barriers

10. Eliminate Slogans

11. Methods

12. Joy in Work

13. Continuing Education

14. Accomplish the Transformation (Deming, 1986).

This step-by-step approach has been endorsed by Glasser and enhanced in the management system called Quality Schools. Glasser's system uses the philosophy of Deming to work towards motivating students doing useful work (Glasser, 1993). Glasser (1993) wrote about six conditions of these Quality Schools and their schoolwork: 1. "There must be a warm, supportive classroom environment" (p. 22). This can't be achieved if an adversarial relationship between teacher and student exists. Students need

to trust their teachers, be able to talk and to discuss ideas. Under no circumstances should any one coerce another.

2. "Students should be asked to do only useful work" (p. 22). All work should make sense; it must fit into some use: aesthetic, artistic, intellectual or social. Students should not be forced to memorize something that will soon be forgotten.

3. "Students are always asked to do the best they can do" (p. 23). Quality work takes time and effort. Teachers will provide time for students, and students will be full of effort. Today, many students travel too fast or too slow through their academics.

4. "Students are asked to evaluate their own work and improve it" (p. 24). Quality work, good as it may be, is never static. "As Deming says, quality can almost always be improved" (Glasser, 1993, p. 24).

5. "Quality work always feels good" (p.24). Quality work engenders self-esteem, and feels good for everyone involved, the consumers of education: students, teachers, and parents. Personal achievement, whether through hard work, or obtained as a bargain hunter at a rummage sale, is satisfying.

6. "Quality work is never destructive" (p. 25). Therefore, achieving good feelings through the use of addictive drugs or harming people, property, or the environment, which belongs to all of us, does not meet the definition of quality work (Glasser, 1993).

Combining Dr. Glasser's theory of Quality Schools with his *control theory* has allowed educators to redirect the pedagogy in order to re-energize the student's motivation (Glasser, 1993). In a quality world, control theory encompasses five basic needs in each individual's life:

1.   The need to survive and reproduce

2.   The need to belong: to love, share, and cooperate

3.   The need for power

4.   A need for freedom

5.   The need for fun (Glasser, 1984).

These basic needs are often forgotten in the contemporary educational philosophy employed in our public schools today. When students are forced into compliance with an ever-expanding list of rules and acts of punishment, they revolt against learning. This rebellion is carried out with an extremely competitive zeal that is not healthy for any mainstream classroom. What happens is the fragmentation of the student body into cliques and castes, which provide security and satisfaction in pursuit of those five basic needs (Glasser, 1969).

The Technology Education department has become a last resort for most high school Guidance departments when they are confronted with uncontrollable, non-conforming, potential dropout students. They reason that most difficult students learn better with a hands-on educational curriculum. The real reason, according to Glasser, is that technology education provides students with relevant practical information that can be related to a current or perceived use. Students can develop skills that allow them a degree of success, which in turn provides incentive to perform quality schoolwork (Glasser, 1992). Technology education would be a great introductory subject in which to implement a Quality School system, not only in the sense of practical, hands-on educational projects, but because of the number of problem students that attend this type of class. If Glasser's education model will work for technology education, the probability that it would work in other classes is high.

The intent of this research will be to compare two types of educational classroom management systems, Total Quality Management/Quality School and Boss Management/ Stimulus-Response, as methods to manage motivation, creativity, and student performance in technology education in high school.

Statement of the problem

Secondary educators in America are confronted with a new breed of informed students. A number of educators would like to provide a quality curriculum that would allow students to make their own choices instead of being coerced. The boss-management system philosophy has developed an adversary-conflict environment in high school that has been linked to students' lack of motivation, creativity, and performance. Students develop a failure identity where the means of perceived self-worth is classroom disruption. The act of disruption is depriving many students of a lasting and equal education (Glasser, 1992).

Hypothesis

It is hypothesized that there will be a difference in the level of achievement shown two groups of students - one group being educated using a quality, lead-management school philosophy, and the other group being educated in a boss-management/stimulus-response system.

Null Hypothesis

There is no statistically significant difference in classroom performance, as measured by a pretest, posttest, and overall grade recorded, in home and auto technology education classes in high school, for students being educated using a quality, lead-management school philosophy, compared to students being educated in a boss-management/stimulus-response system.

Purpose of the study

The purpose of this study will be to compare the two educational management systems: (a) the boss/top-down management approach, using stimulus-response; and (b) Glasser's Quality School, employing Deming's Total Quality Management. The study will determine whether students experience better performance being educated using a quality/lead- management system, as measured by a pretest and a posttest, in a home and auto technology education class in high school, compared to students being educated in a boss-management system.

Definition of Terms

1. Boss Management: A master system, utilizing control or power of authority over a group of workers or people in the workplace, using a stimulus-response philosophy, with rewards and punishments to stimulate greater production of goods and services. A system that does not allow for quality decision-making on the part of the worker, with a definite negative effect on the creativity of the worker (Glasser, 1992).

2.   Lead Management: A cooperative system of supervisors that leads workers or students to accomplish tasks without bossing (Deming, 1986).

3.   Proactive learners: Students who take the initiative in learning (Knowles, 1975).

4.   Quality School: A school where quality work and study take place (Glasser, 1992).

5.   Reactive learners: Students who passively wait to be directed in the learning process (Knowles, 1975).

6.   Total Quality Management (TQM): "A management philosophy that solicits participation and commitment from all levels of employees to improve quality of goods and services that the customer of the organization needs" (Lewis & Smith, 1994, p. 64).

Chapter II

Review of the Literature

During the past decade, there has been an explosion of books in the field of Total Quality Management (TQM). Yet with all the books and billions of words written on the subject, there is an absence of two essential ingredients: a good working *definition*, and a clear and simple *systems model* of total quality (Lewis & Smith, 1994). The review of literature will investigate why a subject so widely expounded could seem so elusive in description and functional models. A journey through the writings and investigations should shed some informational light on this subject.

Defining Total Quality Management

John P. Grier stated, "The will to believe is perhaps the most powerful, but certainly the most dangerous human attribute" (Dobyns & Mason, 1994, p. 1). This statement exemplifies a major aspect of defining total quality management, a belief in the management of a system, not the people in the system (Deming, 1991). Dobyns and Mason (1994) state that "quality isn't a convenient list you can consult or even anything you can look at. Thinking is an invisible process, and what American managers must change if we are to survive is how they think and what they believe" (p.1).

Lewis and Smith (1994) define total quality as "a set of philosophies by which management systems can direct the efficient achievement of the objectives of the organization to insure customer satisfaction and maximize stakeholder value" (p. 29).

With this simple explanation a host of confusing ideas crop up when quality is adapted to the educational function. Who are the customers? Students, parents, community members, legislators, school board members, employers, training personnel, and the prevailing "others" are the customers (Harris & Wiedmer, 1997). Lewis and Smith (1994) warn that a customer of a process could be the next process, not a person at all. The need for a customer is essential to the real practice of total quality.

Scrabec (2000), in his article "A Quality Education Is Not Customer Driven," describes fundamental problems in a customer-driven model for education. First, students are not customers. Even though some pay for their education, they are recipients of a service. A customer is more than a purchaser; a customer defines the requirements for a quality product or service. Allowing students to set education specifications would degrade the very service being sold. Scrabec believes that one could include parents, industry and society as customers, but he feels they are not customers; rather they are the beneficiaries of education. The customer-driven approach lacks a customer. Without a primary customer role, who will set the service standards? Harris and Wiedmer (1997) claim that everyone in the community is a customer, while Scrabec (2000) takes an opposing view. Many Total Quality Management advocates have over-simplified the situation by applying the role of customer to the student population. He states, "Student satisfaction does not necessarily measure the quality of the education, though it may be one indicator" (Scrabec, 2000, p. 1).

There are examples of student/customer-based schools. One of the most noted is George Westinghouse Vocational and Technical High School. Located in Brooklyn, New York, George Westinghouse was in its sixth year of operation as a TQM school and

was having tremendous success allowing students to be a part of the customer group, as Rappaport reported about it. Students divided the group of customers into an internal customer group and an external customer group. Internal customers were students and parents. External customers included corporate businesses, community service groups, and the area residents. The relationship of parents and students as customers worked well, proving Quentin's concern to be unfounded speculation. The George Westinghouse High School (GWHS) student and parent customer model works extremely well. Students have asked for more help, have invented educational improvements for the common good of all, and have developed peer study groups or mentor systems called student apprentices. The apprentice idea encompasses a big brother/big sister style relationship, where freshmen and seniors are paired for a mentor program. Seniors provide freshmen a connection of friendship in school, a kind of family connection, and examples of success not available in many inner city schools or social experiences (Rappaport, 1996).

When improvement happens in the New York school system, many professional people want to investigate. The request to study GWHS and the new system of management developed a disruptive atmosphere. Tours of the school have been limited to twelve tours per month. The limit has backlogged requests, and in order to be considered for a tour, a person is given three books to read and a student-administered phone survey to gain access. If a person doesn't pass the test, he/she is asked to reread the material, with student volunteer assistance if needed. A succinct four-page response from one state school district superintendent who had been asked to reread the information for access has been recorded. A student tested him, and his answers clearly

revealed he had not read the material (Hequet, 1995). The researcher was given the impression this administrator was not given the privilege of entry even though he expected his executive standing to provide automatic acceptance.

GWHS has found that student customers have not degraded the services offered by the school; rather they push for higher quality achievements. Students have introduced student contracts and a ninth through twelfth grade mentoring/apprentice system. They have developed connections for outside help with college entrance exams, and they work with local corporations for on-the-job training in electronics. All accomplishments are jointly shared by the school, not by any single group.

Rappaport's report described the school theme that all factions of the school's organization work continually on improvement; with reminders to the reader it is a continuous process of repeated evaluation of quality (Rappaport, 1996). Students and parents are viable customers of education, and as long as the goal is improvement, allowing students and parents to set specifications may not degrade the product, as Quentin predicted. What Quentin may have inadvertently revealed was the problem of understanding an idea when using conventional management structure to implement change.

Oren Harari published a provocative article in *Management Review* entitled "Ten Reasons TQM Doesn't Work." Harari, after reviewing all the independent research conducted by consulting firms Arthur D. Little, Ernst & Young, Rath & Strong, McKinsey & Co., and A.T. Kearney, found that only about one-fifth, or at best, one–third of TQM programs in the United States have achieved significant or even tangible improvements in quality, productivity, competitiveness or financial returns (Harari,

1997). The problem could be construed as serious, given the fact that three-quarters of reasonable-sized American firms claim to have invested in some form of TQM. His point was that quality is essential for organizational success. TQM programs were not the only possible means toward obtaining quality. Harari (1997) writes, "Quality is about unbending focus, passion, iron discipline, and the way of all hands. TQM is about statistics, jargon, committees, and quality departments" (p. 38). A review of his ten reasons indicates why he believes TQM doesn't work:

1. TQM focuses peoples' attention on internal processes rather than on the external results**.** This thinking has reduced the focus from the customer to the preoccupation of internal processes, clouding the effort to maintain an external connection to the marketplace. As one manager stated in the article, "Before TQM, the rap on our company was that we churn out poorly-made products that customers don't want. Now, after TQM, things have changed. We now churn out well-made products that our customers don't want" (Harari, 1997, p. 39).

2. TQM focuses on minimum standards. Zero defect, with no rework, is a laudable goal, but not enough in what Harari (1997) labels "the frenzied global economy" (p. 40). This point has global implications. Most United States companies project significant improvement in their quality practices three years from now, but concede that companies in other countries are so far ahead of them that the accomplishment will pale in significance. A *Consumer Reports* article noted, "Americans are building nice, average cars, but few 'gee-whiz-look-at-this' cars." The

"wow" factor is essential to how customers view quality (Harari, 1997, p. 40).

3. TQM develops its own cumbersome bureaucracy. The problem cited in this situation can be related to the inability of companies to understand what TQM really is. Harari (1997) points out what he learned in interviews with executives of successfully engineered, quality turnarounds, "They will tell you that real total quality emerges from a chaotic, disruptive, emotional process that rips the guts of any organization and rebuilds it from the bottom up" (p. 41). Harari thinks that instead of going through this process and then emerging as a TQM company, most companies that claim that they are really have not gone through the process; instead, they have a bureaucracy which makes them look good on paper.

4. TQM delegates quality to quality czars and experts rather than real people. The idea of delegating the responsibility of quality to czars and experts is a perfect example of the misunderstanding of TQM. As developed by Deming, one cannot separate and build a department to deal with quality. That is top-down management. Harari (1997) states, "A quality department allows senior-line managers, middle managers, and non-managers to go about their business without having to account for quality. It becomes the quality department's job" (p. 42).

5. TQM does not demand radical organizational reform. The plain fact of life, as Harari (1997) explains, is that authentic quality improvement

demands the flattening of structures, the liberation of the line manager
from corporate control, front line people from line management, and
"the breakdown of functional foxholes. Cross-disciplinary, cross-
departmental efforts, which include outsiders like customers and
suppliers, must become the institutionalized norm. Complete
interdisciplinary collaboration must replace a system that works as its
own little part of the puzzle" (p. 42).

6. TQM does not demand changes in management compensation. The
Ernst and Young study (Harari, 1997) examined a number of companies
in the auto, computer, banking, and healthcare industries, finding that
quality control measures of customer satisfaction and zero-defect rates
determined senior management pay in less than twenty percent of the
organizations. Profitability still matters the most in all four industries.
Harari asks if that could be the reason why we have so many troubled
companies in those industries (Harari, 1997).

7. TQM does not demand entirely new relationships with outside partners.
The inner-directed barrier to true quality is exposed in the seventh
problem with so much work being subcontracted and outsourced, often
globally, and with the need for lightning-fast, top-quality work. New,
non-adversarial, non-legalistic relationships among partners become
crucial for total quality management. The relations of the modern
supply system are based on what Harari calls soft, squishy concepts like
trust, honesty, inclusion, mutual support, and candid, non-legalistic

expectations of both parties' responsibilities (Harari, 1997). The

successful companies no longer pressure their suppliers to save a few

dollars at the cost of quality. They also try to shrink the supplier list

with mutual-advantage, multi-year contracts, or by actually bringing the

suppliers into the company. Pitting one supplier against another to

instigate bidding wars, or the sharing of confidential blueprints and bids

to see if they can be undercut, are not practiced by companies using the

TQM philosophy, possibly to the detriment of true quality gains for

these companies.

8. TQM appeals to faddism, egoism, and quick-fixes. What Harari points

   out in this example is the marketing ploy used by the vendors of TQM

   seminars. These vendors want to market their product, TQM, with an

   eye on profit and the hope of instilling in managers an added incentive to

   adopt the blueprint of their program (Harari, 1997). If quality were

   practiced correctly, all of the premises of personal gain would be

   berated.

9. TQM drains entrepreneurship and innovation from corporate culture.

   TQM programs attempt to standardize and internalize all management

   practices with a carefully developed set of measurements and

   methodology (Harari, 1997). Deming warned management about

   marketing ploy slogans for clean-management implementations, zero-

   defects, and doing-it-right-the-first-time, in his list of fourteen steps to

quality (Deming, 1986). Quality depends on innovation and chaos to invent and improve.

10. TQM has no place for love. Harari (1997) points out, "TQM attempts to make quality happen via an analytically detached, sterile, mechanical path. What is missing, frankly, is emotion and soul" (p. 43).

This list of the ten things that Harari says are wrong with Total Quality Management must be classified as a satire of what happened to a good idea after boss-management concepts tried to organize the program to fit a top-down approach. Harari's article provides an insight into how much change is in order to implement a true quality program. The difficulty of defining this process has made the interpretation hinge on one's own approach to management. It hammers home the idea of how difficult change is (Deming, 1986).

The main focus of quality is on the why. It goes beyond the how to include the why. According to the process of quality control, all mistakes should be identified in each process of a product and should be disclosed to those in the next process, in order to improve quality (Lewis & Smith, 1994). This is a difficult practice to introduce because people tend to find the errors caused by others and neglect to recognize their own. Unfortunately this skill of self-evaluation is exactly what is needed to achieve total quality.

William Glasser has recognized this short-coming and has related a process he calls *concurrent evaluation* in his book *The Quality School Teacher* (Glasser, 1993). The example he uses is a ninth grade introductory math class. The process would start students in a basic math book and ask them to review the book's content and work on the

chapter problems until the students would reach a point where their math skills were challenged. This would then become the starting point of their math education in ninth grade. Some students, as Glasser has observed, will make it past the introductory area of simple adding and subtracting, while others would or could go as far as through most of the algebra text. The next step would be to assign students to groups of three or four, but not more than six. The grouping process could be based on students' levels of accomplishment, or the mixing of students so that students with higher levels of learning would be available to assist students with lower levels of learning. Next in concurrent learning is labeled "Show and Explain." This is the time when students, having accomplished a section of the text they have studied, ask the teacher to observe the process of the problem they have mastered. The teacher asks them to do a representative problem, explaining the steps to solve the problem, show the work, and explain the process (Glasser, 1993). Show and Explain would then evolve to the system of quality called SIR. Glasser (1993) writes, "S stands for Self-evaluation; I for Improve what has been done; R for Repeat the process until quality has been achieved" (p. 102). This would redirect the thought process of students from looking at what they have accomplished in reference to what other students have done, to working on true mastery of the subject through self-evaluation. A new mindset would begin to take shape, the lower-level students would not be hopelessly lost, materials would not be presented to them without base knowledge, and the advanced students would not feel this bloated sense of accomplishment when comparing their accomplishments to other students, forcing them to work with materials that would be much more challenging and creative (Glasser, 1993).

Traditional management often blames and then takes punitive action. This attitude in upper management tends to encourage workers to hide the real problems they cause, and instead of becoming aware about problems, they tend to look the other way (Lewis & Smith, 1994). Students have adapted to this system of management by studying for testing and not for learning, or by cheating on tests, copying homework, and not challenging themselves other than to receive a grade. The problem of really mastering something isn't to question it; rather it is to compare one's grade point to others' grade points. If defining quality were based on grades, then the system currently employed in education would accomplish the task (Glasser, 1992).

Another definition of the process of quality management is in the concept of control and the definition of the word *control*. The Japanese notion of the word is extremely different from the way we interpret it as Americans. In the United States, control is viewed in management as someone or something that limits an operation, process, or person. It is compared to a police force in the industrial setting and is resented. Lewis and Smith (1994) state, "In Japan, as pointed out by the Union of Japanese Scientists and Engineers counselor and Japanese quality control scholar Noriaki Kano, *control* means 'all necessary activities for achieving objectives in the long-term, efficiently and economically. Control, therefore, is doing whatever is needed to accomplish what we want to do as an organization'" (p.30).

The difference is better explained in *Figure 1*. The chart is designed in a circle to denote the continuous process. This is called the Continuous Improvement Chart, which is widely used in Japan to describe the cycle of control. In America, where specialization and division of labor are emphasized, the concept of quality management using the

PDCA Chart - plan, do check, and act - is misunderstood. Americans' cycle would change to fight, plan, do, and check. Instead of working together to solve problems or deviations from the plan, time is spent arguing about who is responsible for the plans (Lewis & Smith, 1994).

Figure 1. Continuous Improvement Chart
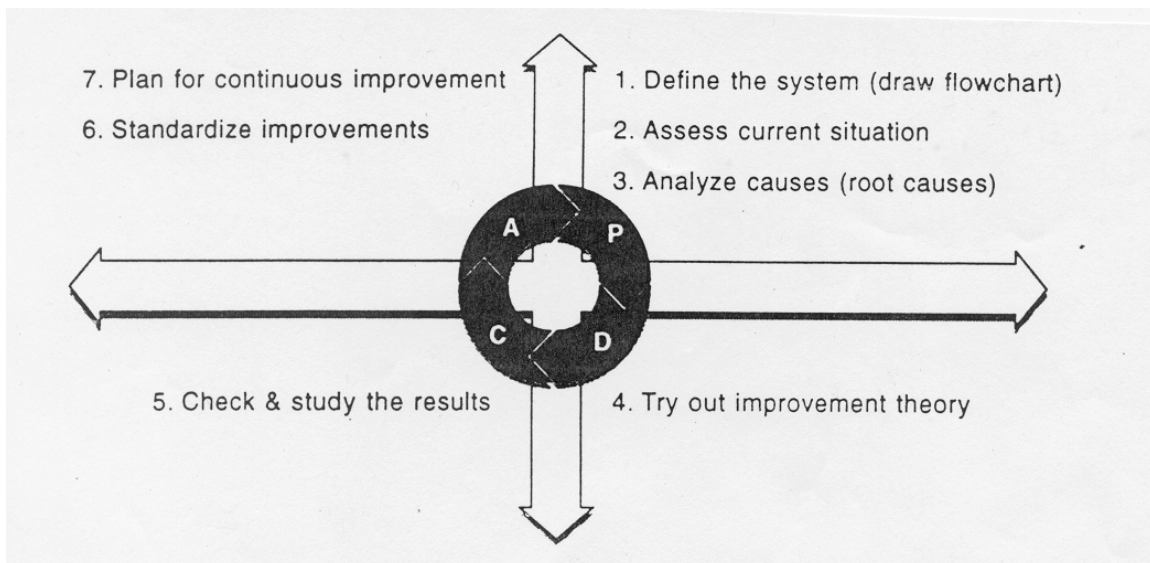
The opening paragraph of this thesis's Chapter II "Review of the Literature" directed this review to study and define Quality Management as a system of change for education. The information presented in this first section described the basic components of that system, expressed here as statements:

1.   A well-defined customer evaluates a product or service.

2.   The people work in a system, with the job of a manager being to work on the system, to improve it continuously with their help.

3.   Recognize quality improvement as a system.

4.   Share accomplishments as a team, not as personal gains.

5.   Measure gains in quality and link them to customer delight.

6.   Work with subordinates in improving the system.

A Simple Systems Model

The last investigative question to address in this review of literature would be a clear and simple systems-model of total quality that would fit education. A simple-systems model for students could best be explained using steps of employment. Harris and Wiedmer (1997) explain in their article, "Implications of Total Quality Management in Education," that the first step in implementing Total Quality Management in Education (TQE) is to involve school personnel in reviewing successful models as a guide. Studying TQM or TQE theories and concepts, and then developing a system that would use this information to address the particular needs of each school, would be a school district's goal. The Newton Success-Oriented School Model in Newton, Connecticut, was developed using this process in a summer institute that participants viewed as the cornerstone of their quality success. Planning did not end there. After two years of introducing the new management system to the school, they found the need to re-evaluate the original constancy of purpose because they felt that students could benefit even more by doing so (Harris & Wiedmer, 1997). This observation is consistent with the theory of TQM. Quality is a constantly-changing management system, with nothing being constant but the changes themselves (Deming, 1982). The Newtown School District has experienced improvement in a number of targeted areas of student performance, and is finding new goals to set for accomplishments. The Newtown community has involved

teachers, parents, and students in the educational process, a major first step to quality (Harris & Wiedmer, 1997).

The second step is to involve students and parents, needing to understand customer feedback. George Westinghouse High School proved the need to involve students and parents in educational goal setting (Rappaport, 1996). There are other examples. Mt. Edgecumbe High School in Sitka, Alaska, is considered a true Deming-based school. David Langford (1993), a teacher at Mt. Edgecumbe, explains what he has witnessed about student customers and the idea of student self-management. "The problem with a lot of what is happening out there is that people aren't taking education down to the kid level," says Langford (Schmoker & Wilson, 1993, p. 130). First and foremost, he decided he owed his students an opportunity to explore the reasons they were asked to work and study. The first week of class, students were asked such questions as: Why are we here? What do we want from this class? What are the barriers to success? And lastly, what does it mean to complete this course with quality? The questions provided student ownership to the process. The result was an extreme improvement in students' attitudes about education and the need to improve (Schmoker & Wilson, 1993).

The third step of developing a TQM School is to receive and to utilize external input from the community in what is needed for skills in the workforce. Students at Mt. Edgecumbe are encouraged to serve internships and apprenticeships. One local corporate officer praised students for their self-starting attitude and the ability to dive into complex analysis of business problems. The key to engagement of students in learning is clearly

showing students how present efforts contribute to what they want in life (Schmoker &
Wilson, 1993).

There are eight steps that will summarize what a systems-model is, to develop a total
quality school system:

1. *Purpose:* Students have a clear, well-defined purpose centered on academic and
   intellectual accomplishments. This purpose is vigilantly reiterated and reinforced.

2. *Measurement:* Teachers plan carefully and then regularly and relentlessly
   measure progress for every significant goal. They use this measurement not to
   punish, but to continually improve teacher and student performance.

3. *Morale:* Administration maintains a high morale by creating a democratic, non-
   coercive atmosphere that promotes trust and employee commitment.

4. *Teams:* Teachers make time for teams to meet regularly, to discuss the latest
   research, share data on progress, help each other to implement the best teaching
   methods, and improve on them.

5. *Problems:* Administration, along with parents and teachers, fosters a culture in
   which employees routinely identify new problems to work on, as well as new
   areas to improve. They celebrate their success in addressing these problems.

6. *Training:* Administrations continually train employees in the areas where they
   can most benefit.

7. *Innovation:* Administrations recognize employees' strengths and expertise by
   implementing their innovations and suggestions for improvement. They pilot new
   methods and gather data before instituting them on a large scale.

8. *Money:* Administrations demonstrate that much more can be done with existing resources, although additional funds certainly could accelerate their success (Schmoker & Wilson, 1993, p. 69).

They expand the ideas of what schools need by quoting an example from a notebook titled *Instituting Deming's Methods for Management of Productivity and Quality.* In this publication is an example of what is needed from everyone involved in business and education to develop TQM. Deming (1993) uses a good orchestra as an example of an optimized system. "The players are not there to play solos as prima donnas, each one trying to catch the ear of the listener. They are there to support each other" (Schmoker & Wilson, 1993, p.30).

Another study in improving education where Total Quality Management has played a pivotal role is the special report produced by Bill Gaslin, Ed.D., and Tom Tapper, Ed.D., (2001), called "A Minnesota School District Uses Quality Principles to Resolve School-Community Conflicts." It is an example of school districts recognizing the power of TQM. The report defined the problem of passing a referendum to bond the district taxpayers to a rebuilding project that had been voted down twice. The district was faced with the difficult questions of how to handle overcrowded school classrooms and deteriorating facilities inadequate to provide quality education. The district was in complete turmoil, filled with confrontational groups of community members. The school board decided to take a third bond issue to the voters. This time the school board enlisted Total Quality Management principles and formed a blue ribbon task force. This task force of twenty-five included representatives of previous referendum support groups, community leaders, school personnel, and groups which were opponents to the last two

referendums. In the process of planning the task force approach, it was decided to use

quality applications that would allow all participants to be involved in the planning

process without the fear of intimidation. In addition, the use of statistical control tools

would help develop their plan. The planning project involved seven meetings over a

period of six weeks. The system the task force developed contained much of the same

processes as the previous examples reviewed in this chapter. The processes explained are

true to the concept that each application is different. The report explained how each

meeting was designed as a step in establishing a link with a number of Deming's fourteen

points (Gaslin & Tapper, 2001). A summary of each meeting, as described by Gaslin and

Tapper, is given in the following paragraphs.

Meeting One: Establishing the Culture. The main objective of this first meeting was

to establish a working environment of comfort, without hostilities, to promote open

communication. To accomplish this, members were asked to describe a quality

experience. All the members shared experiences, developing a list or set of common

understandings of quality. Next, the task force met in small groups, with the quality list

taped to the wall for all groups to see. The groups reflected on what they valued in a

working relationship, using the same process of consensus building. A final list of values

was developed and used as the standard of communication for the rest of the planned

meetings. Wallet-sized copies of the values were printed, and the list was posted at each

meeting. The list was referred to when interaction became tense. This helped to keep

members working constructively toward their objective (Gaslin & Tapper, 2001).

Meeting Two: Identifying Challenges. The task force was again divided into small

groups and proceeded to identify factors that were instrumental in preventing the school

district from passing a referendum. The consensus-building process was repeated, this time looking for positive forces that, when unleashed, would help the district pass a referendum. This approach system used force-field analysis to project the positive objective of a passed referendum. All the ideas, both positive and negative, were posted, and a rating system of three different-colored, point-valued stickers was given to the members so that they could rate the importance of accomplishing objectives of each idea. This makes it possible to use a charting system referred to as a Pareto Chart, which Lewis and Smith (1994) describe as "a graphical technique for rank ordering causes or issues from the most to the least significant" (p. 98). The chart helped identify the primary obstacles to not passing a referendum and the most effective positive forces that would pass it (Gaslin & Tapper, 2001).

Meeting Three: Identifying Solutions. The third meeting introduced cause and effect diagramming as a way to identify solutions. The problem to be resolved was a failed referendum. Small groups were again challenged with the task, and solutions were listed and charted (Gaslin & Tapper, 2001).

Meeting Four: Listening to Experts. All the parties involved in the planned school district improvements were invited to this gathering. Information packets had been distributed to task force members at the end of the last meeting, with each member being given an opportunity to ask two questions from any expert. The format of the meeting resembled a press conference. The ground rules were simple, and all questions had to be straightforward and stated in a non-argumentative fashion. Many of the questions focused on the issues that had been identified in previous sessions (Gaslin & Tapper, 2001).

Meeting Five: Building Solutions. The process of building solutions began using the same team approach. The cause and effect diagrams and the Pareto Chart showing results of problems that were instrumental in past failures of the referendum were analyzed (Gaslin & Tapper, 2001).

Meeting Six: Refining Solutions. At this meeting the small groups were consolidated into two. The first group worked on reviewing previously developed solutions, consolidating and refining all recommendations into a single set for consideration by the entire task force. The second group made sure that there were no gaps in the planning process. Their task was to develop any new recommendations for the express purpose of successfully presenting the bond issue to the public. At the conclusion of this session, the groups presented their findings to the entire task force (Gaslin & Tapper, 2001).

Meeting Seven: Putting the Plan Together. The group had one final meeting. The set of final solutions was placed on the meeting room wall. Participants discussed the importance of each, and the group made the final refinements of the solutions, removing any solution that could not achieve group consensus. This resulted in nine recommendations that the task force felt gave the bond issue the best possible chance to pass. The effort resulted in a successful campaign to pass a referendum that had numerous changes from the two defeated referendums but solved the need of quality educational facilities (Gaslin & Tapper, 2001).

The use of total quality consensus-building and involving statistical analysis of problem-solving allowed the sharing of a solution of improvement. Sharing this accomplishment as a task force was accomplished through lead management. The task force was allowed to brainstorm solutions in a non-confrontational way, respecting all

members' opinions. The steps taken were similar to other examples cited in this paper. What has been constant in each example is the need to allow human creative problem-solving to claim the credit of accomplishment, with respect and compassion for each participant's perspective, helping to build trust and understanding. The other factor pointed out in this article was how important statistical-controls tools were in the organization of facts and information. Dr. Deming refers to this practice as *obtaining profound knowledge*. This theory suggests that management must understand how theories of variation, knowledge, systems, and psychology interconnect to optimize organizational aims (Deming, 1986).

Sharon Walker (2001) used the theory of obtaining profound knowledge in her research *Using Statistical Process Control to Improve Attendance*. Walker cites Deming's theory that managers cannot lead organizations without knowledge of how each of these elements impacts the other. She maintains, throughout her research as a principal of a small high school in Southern Arizona, that using a systems approach works well when dealing with the problem of attendance. Employing the people who work in the system to recreate the system would improve school attendance. Statistical Process Control (SPC) would be the main process employed to improve the overall attendance rating (Walker, 2001).

In Arizona, school funding is based on attendance. Students are required to attend high school for a minimum of 175 days. When students miss days, they waste instruction time later on in order to be brought up-to-speed with the rest of the class. Teachers disliked the extra preparation time they spent on students who were continually absent. The school administration began complaining of lost revenue (Walker, 2001).

The vice-principal, in charge of discipline and attendance, implemented a system of rewards and punishment (stimulus-response) in order to attract students to school. They included gift certificates to local stores for food, clothing, or music purchases. This was awarded to students with 100% attendance each month. This system attracted students who came to school already, but didn't affect the students who were continually absent. The problem students were summoned to the office and given detention time. After a number of detentions, parents were asked to come in and support the rules. The final punishments were a series of three-day suspensions. This simply exacerbated the problem, even as the school worked with the truancy court to force attendance - to no avail. The program of rewards and punishments did nothing to increase attendance rates (Walker, 2001).

The approach had to be changed, with the root of the problem needing to be researched first to discover what could be done to improve the attendance rate. Deming's TQM was used. Based on his principle that those who work in the system can contribute the most to solving problems in the system, a task force of students, teachers, parents, and administrators was formed, to address the problem of attendance. An organizational system of data collection called Hoshin Planning was used and followed a question-based framework of macro and micro questions (Walker, 2001).

The group began by asking for the purpose of the data collection, and then posed a question to guide data collection. The group decided on the kind of data they would use to answer the question and called this input. The next step was to determine what the output should mean. Tools were listed that would be used to collect data and display the

results. The task force then formed and analyzed theories. These theories usually formed the basis for the next question.

The first macro question asked was why the attendance rate at their school was not at a respectable 94 percent rate. Their school's poorer rate was increasing the work load for teachers and reducing state aid. The first micro question asked what influenced students not to attend school. This question was asked to help the task force understand what prevented students from attending school. To answer this question, a listing of the variables that affected student attendance/absenteeism under the current system was collected. A cause-and-effect diagram tracked the brainstorming process. This creative process of asking the people in the system was the input. The cause-and-effect diagram, showing school system influence on what determines whether students attend school, was their output (Walker, 2001).

The group brainstormed five categories of influences: (a) instruction and curriculum, (b) economic environment, (c) people, (d) social environment, and (e) outside-agency influence. At this point, the task force then brainstormed each category. The result was a good picture of what the committee viewed as the reasons students missed class. The material was further analyzed to pick at least three areas where the school and community could make improvements. This information was forwarded to the school's administration (Walker, 2001).

Ms. Walker points out some misgivings about this approach, examples where she feels the task force was lost, not knowing exactly what the next step should be. But she points out that the group was able to assess and analyze their current system by studying the process, something they had never done before. She has strong convictions that as

she gains experience in this style of management, results will improve. The problem of absenteeism at her school did improve to a certain extent, but the 94 percent rate was not achieved (Walker, 2001).

As was pointed out by Lewis and Smith in the beginning of this chapter, the information pertaining to quality management has been extensively covered in many avenues of literature. When the researcher questioned his school's educational systems administrators, all had heard of the idea of total quality management, but none felt confident they could administer such a system in education because it would erode their concept of administrative power. The researcher also inquired fellow instructors as to their knowledge about Deming's and Glasser's systems and philosophies, finding very few teachers ever having heard of Deming, total quality management, or how it could be adapted to classroom management. This observation reinforces Glasser's contention that teachers only concern themselves with modern approaches to punishment-reward systems. Searching for, and implementing, other classroom management concepts is overshadowed with administrators pressuring teachers to improve their boss management skills. Classroom management skills taught in order to achieve student-based quality experiences must include, and be endorsed through, the administrators who remain as the main driving force (Glasser, 1992). Deming's statement, that the workers work in the system, and the administrators work on the system, cannot be included in the curriculum if administrators insist that teachers approach classroom management with strict reward/punishment stimulus-response systems. The discussion about classroom management methods is overlooked, especially when looked at as possible solutions - a better educational approach. Can a teacher instill a motivational climate for students to

do quality work in school, without citing the number of threats of punishment and rewards of privilege as contributing factors in the alienation of students to the educational system (Glasser, 1992)?

The study described in the next chapter is an attempt by the researcher to experiment with a Quality Schools classroom approach after comparing what different researchers reported about their styles of management. Thus the experimenter could embark upon and follow through with a curriculum plan that would help to gain a perspective of the advantages or disadvantages of Total Quality Management when compared to boss management systems in education.

Chapter III

Procedure

As secondary educators in America are being confronted with a new breed of informed students, a number of these educators would like to provide a quality curriculum that would allow students to make their own choices instead of being coerced. When linked to students' lack of motivation, creativity, and performance, boss management systems and their philosophy have come into question. This may be depriving students of a lasting and equal education (Glasser, 1992).

The purpose of this study is to compare two educational management systems: boss/top-down management using stimulus-response, and Glasser's Quality School, employing Deming's Total Quality Management. It is hypothesized that students being educated using quality, lead management develop significantly higher levels of classroom performance, compared to students being educated in a boss-management system. The students' responses and growing awareness and development of their skills related to the curriculum are measured by a pretest, a posttest, and their overall grade, recorded in a home and auto technology education class in high school. This study hoped to prove at least some of the variables of the hypothesis as correct.

Subjects

Two home and auto classes in the Technology Education Department of a medium-sized Midwestern high school constituted the subjects for this study. The 43

students who began the experiment ranged in ages from 15 to 18 years, with almost half of the subjects college-bound, and with the ratio of male to female students almost equal. There were no physically handicapped students involved. After the classes started, two students moved, and one student skipped school enough times so as to be removed from the study. The statisticians, who analyzed the data and produced the t-test to measure the results of the study, directed this experimenter to remove one other student from the study. Their reasoning was that the mean average of the control group would have been adversely affected by adding this student's score to that number. He had done a good job on the pretest, but decided to not bother completing the posttest, stating that he had other things to do (he had already graduated). His unwillingness to take the posttest was not a true measurement of his actual accomplishment in the class; however, his final grade was given and figured the same as for all the other students, since none of the students' pretest or posttest scores were averaged into their final grades. Thus, the total number of students who finished the experiment was 38.

A flip of the coin decided the style of classroom management employed with each group. Group A, serving as the experimental group, met during the sixth hour, and Group B, serving as the control group, met during the seventh hour.

Variables

Because this is an experimental study, the independent variable (quality/lead-management) will be manipulated, to determine whether the dependent variable (achievement) will be affected, when the experimental group is compared with the control group.

Instrumentation

The study lasted for 18 weeks, or one semester. The high school's schedule has a four period day, with one group of students taking the class on odd days, and another group of students taking the class on even days. The experimental group A attended class on odd days beginning with the seventh hour (fourth period), and the control group B attended class on even days, beginning with the sixth hour (third period).

The first week of classes, a pretest was given to all the students in both classes (see Appendix A). The test was a cross-section sample of the subject material that would be covered in these two classes. The posttest was given to the classes a week before the final exam (see Appendix A). The scores on these two tests did not get averaged into their final grades; however, both were used to reflect individual students' progress.

Objective tests were administered after each major unit was completed. The quality of the final product was determined by the teacher, using a rubric that evaluated how well the students developed their practical, mechanical skills during the building of the mockup. All of these tools combined to produce the final grade. Achievement levels were determined by the final grade.

Administration

The two areas of study taught during this class were home improvement and auto maintenance, with more time spent on the building of a mockup in the home improvement part of the class, when compared to the auto unit. The experimental group A used Glasser's quality/lead management philosophy, and the control group B used the boss management philosophy.

The experimental group's pretest scores were used to build teams of four participants each for the home improvement project. Glasser's six conditions of a Quality School (see Appendix B), with a quality/ lead-management model, were used as motivational techniques with the seventh hour experimental group; choice theory was explained to these students to allow them the chance to place their educational planning into a perspective set of ownerships of the class.

For the experimental group A, the requirement was to build and install a mock-up cubicle, using plasterboard, electrical materials, plumbing materials, and flooring. Within the initial building structure, having right angled walls four feet long and four feet high, each team member created their own area to work. This cross-structure was set on a four-foot square platform, providing a sub-floor and all the possible surfaces of home construction. To practice in this cubical, the highest-scoring students were divided amongst all the teams, so that the lower-scoring students would have an expert on each team. A self-directed learning exercise was introduced to the class, providing guidelines for performing the roles of *consultant helper* and *observer* (Knowles, 1975). The objective of this exercise was to establish a plan for students to provide kinder relationships with each other, and to guard against one person doing all the work for the group. The student expert became the consultant, but each student had to give a working explanation of the important steps that were followed to accomplish the task of home improvement that he/she had mastered.

The leader (teacher) became the customer of the task, such as wiring or wall-building, and the leader recorded the satisfaction of a job well-done. Observations by the teacher-facilitator happened on a daily basis. Students were asked to define the most

difficult task in the list of steps they had to perform. Then they had to re-work that step until total understanding of the technique was mastered and explained to the highest-scoring student and the teacher.

For the experimental group A, concurrent evaluation was used, involving students in the process of evaluating their own work as they did it. This was done throughout the whole semester at points of progress or change, determined by the teacher and the student on an individual basis. A fish-bone chart (Lewis and Smith, 1994), or flow chart, of the steps that had to be accomplished and mastered, was drawn up by each group. Lab work evaluations used the concepts of showing and explaining to the teacher, and a self-developed rubric to plan each day's work schedule was created by the group.

The acronym SIR (from the Quality Schools model), with *S* meaning *Self-evaluation*, *I* meaning *Improve what has been done*, and *R* meaning *Repeat the process until quality has been achieved* (Glasser, 1993), was the main tool of incentive for improvement. A student would achieve quality when she/he could show and explain what he/she had done. The student had to prove she/he had used self-evaluation, with significant improvement, when compared to the first attempt.

The auto unit followed the home improvement unit, using a similar sequence of schedules and challenges during a shorter time frame, as well as guidelines for assessment. The experimenter used this system for the entire semester.

The control group B's process began with the pretest in the beginning of the course. The management similarities between group A and group B ended at this point. The researcher/instructor made all of the classroom management decisions in a true boss management, reward and punishment system, orchestrating activities constantly without

asking for student contribution.   Students were asked to read the class syllabus and classroom rules. Students were not asked for input, and group dynamics learning methods were not covered. Individual education concepts were applied with a start-up assignment of reading, and review worksheets for comprehension, replicated from an overhead transparency, were to be handed in at the end of the classroom time.

Students were then allowed to enter the lab to work on their areas of the mockup. They were assigned to the mockups in alphabetical order, without concern for previous experience. Each unit was approached in the same manner, and quarterly tests were used to evaluate the written work. A rubric of inspection was used to evaluate lab work. Students were punished with a three-strike system if they were caught off-task, the third strike earning the student 30 minutes of detention after school and an added ten minutes of detention time if the objectives of the day were not accomplished after the detention was served. This was a way to keep students from just sitting around when making up detention time. The students who remained on-task during the entire class time were rewarded with relaxation time after the objectives of the day (in the classroom and the lab) were accomplished. A corner of the lab or a return to the classroom were the areas where students could congregate so as not to distract students who needed more time to accomplish the day's tasks. Students were allowed to work on personal projects in the lab for extra credit if time allowed, and no one in the class needed the machines they planned to use.

Helping other students in class to do their work was strongly discouraged. All of the control group B's grades were posted on the researcher's office wall using student identification numbers to protect their identity. If a student began to fall behind on the

objectives for the week, he/she was awarded 30 minutes of make-up time after school or during study hall the following week in order to catch up. A small number of students came in on their own to maintain their grade point and to earn relaxation time, or to be able to work on additional projects for extra credit. The added instruction time was donated by the researcher to the students after school and during his prep time.

Chapter IV

Analysis of Data

This study was undertaken in an attempt to determine the effects of student performance and achievement using Glasser's/Deming's Total Quality Management/lead management, when compared to traditional, stimulus-response, boss management, with its punishment and reward system, currently employed in public schools. The purpose of the experiment was to test the hypothesis that students introduced to quality, lead management in a home and auto technology education class would do better on a posttest, compared to students receiving the same curriculum, based on a boss management system.

The null hypothesis stated that there would be no significant difference between the posttest scores of the experimental group and the control group.

Two technology education classes of home and auto were used as the subjects of this study. The experimental student group A was managed using the Glasser/Deming method, employing group dynamic, self-evaluation processes described in the previous chapter as the method of providing students the tools to self-evaluate their educational experience. This system would improve the level of knowledge, measured by the posttest scores, with the lab and written work recorded in the class's final grade in home and auto care.

The control group B was managed using a teacher-directed, boss management system--based on stimulus-response, punishment/reward--described in the previous chapter. It relies on the inconvenience of detention time to coerce students to accomplish their educational tasks.

Results

The 20 students from group A (the experimental group) and 19 students from group B (the control group) were pretested and post-tested. A two-tailed *t*-test (See Table I, page 54.) demonstrated that the two groups were equal in achievement on the pretest.

One student was not included in the final analysis by the statistician, when it was explained that the student decided not to participate in the posttest. The reason given by the student was that he had already graduated and was not concerned with the outcome of the study. He stopped filling out the test after the first few pages and left class. He was removed from the final analysis information. His score was significantly lower on the posttest than on the pretest.

The posttest scores were analyzed using a two-tailed *t*-test was used to analyze the results.

As shown in *Table 1* (See page 54.), The analysis yielded a *t*-score of -.624 with 36 degrees of freedom, which was not significant at the .05 level. The difference between the posttest scores of the two groups was not statistically significant. Therefore, the null hypothesis was accepted in this experimental study. The groups' posttest performance

did not differ enough to rule out random chance being the cause rather than

methods of teaching or classroom atmosphere (Gay, 1987).

two groups when comparing the overall gain in knowledge reflected from the pretest to

the posttest, between the students educated using a quality, lead-management school

philosophy compared to students educated using a boss management, stimulus-response

system. The table's p value of .537 with 38 degrees of freedom proves the null

hypothesis

Table 1
Pretest to Posttest Gain in the Comparison of Control and Experimental Groups

Test	N	Mean Score	Standard Error	t-value	Degrees of Freedom	2-Tail Probability
Pretest Total Score (Gain)	38	-1.16	1.85	.625	35.836	.536
Posttest Total Score	38	-1.16	1.85	-.624	36	.537

$p \leq .05$

Since the gain scores didn't decline significantly in the experimental group, with the

additional group training and the lack of punishment and coercion, the obvious

improvement in interpersonal relationships and a feeling for the team (both difficult to measure objectively), indicate that some of Deming's methods and Glasser's Quality School philosophy provide additional education objectives to the class in the same period of time that was afforded to both classes. This leads to point that this investigator would like to pursue additional experiment opportunities to investigate this concept again.

Chapter V

Discussion

Summary

This study was undertaken in an attempt to determine the effects of student

performance and achievement using Glasser's/Deming's Total Quality Management,

when compared to traditional stimulus-response boss management, with its punishment

and reward system, currently employed in public schools. The premise was that students

introduced to quality, lead management in a home and auto technology education class

would do better on a posttest, compared to students receiving the same curriculum, based

on a boss management system.

The research investigation was introduced to the reader by questioning the ability

of the boss management system to prepare students for the world of information using

telecommunications, without controlled educational guidance to evaluate quality

information. The educational question of whether students have been given enough

analytical skills, to develop their own systems of judgments about the quality of their

work, was researched in this paper. The issue of students having the ability to evaluate

their performance, without external inspection testing, was explored using Glasser's

quality schools' systems, based on Deming's total quality management philosophy. This

system's claim is that students are given more opportunities to gain and retain knowledge

through self-motivation. The practices of traditional, external judgments, provided

through the inspection processes of teacher-guided objectives and rote-memory testing as

means of measuring learning, were also questioned in this study. Many examples that

agreed with Glasser's quality school approach were cited, with two articles reviewed that did not agree with Glasser's/ Deming's approach.

Research about the independent variable used in the experiment – quality/lead management (the guideline for the experimental Group A) - spanned a two-year time frame.   As this system was investigated, the researcher realized that quality/lead classroom management, used as a technique to teach high school students, would be a great change from the boss management system. Classroom management could be approached through a different methodology. Achievement could be gained through students' self-development and self-evaluation, rather than through stimulus-response of punishment and reward.

The experiment itself spanned one semester, taking place in a medium-sized Midwestern high school, with students ranging in age from 15 to 18 years.   Thirty-eight students completed the experiment that consisted of two separate groups taking a home and auto class, offered through the high school's Technology Education Department. For purposes of this experiment, one class was Group A, serving as the experimental group, and the other class was Group B, serving as the control group.

The first week of classes, a pretest, sampling cross sections of the subject material that would be covered throughout the semester, was given to both classes. The independent variable of quality/lead management, and the dependent variable of achievement, was researched throughout the entire semester. Teacher evaluations of the students in the two systems were based on the styles of management. The independent variable of achievement was realized for all individuals in both groups.

Motivational tools used with group A were: concurrent evaluation, a team-designed flow chart of the steps to be mastered, show and explain techniques used in the lab, a work schedule based on group planning, and the use of consultant helpers. All of these tools stemmed from Glasser's Quality Schools' model, which uses the acronym SIR: self-evaluation, improving what has been done, and repeating the process until quality has been achieved. Group B's motivational tool was: acceptance of teacher direction toward the goals of the class. Input from these students was not asked for, nor was it accepted, and no discussion was allowed. Students could not help each other with steps of the processes, and resulting questions and frustrations about the learning challenge had to be answered and accomplished on an individual, teacher-directed basis.

The *t*-test yielded by the statistical analysis comparing the posttest scores of group A and group B determined acceptance of the null hypothesis. There is no statistically significant difference between the scores of group A and B on the posttest. Since the groups' scores were approximately equal on the pretest, using a quality/lead management approach to education, and using a boss management approach to education, resulted in the same increase in achievement, pretest to posttest.

Delimitations of the Study

Many factors determined the students' potential achievement levels in this class. The variables that have caused problems for students in the past include: study skills, manual dexterity, family living conditions (how much time to study or where to study), and prior experience using tools.

During this research, the idea of self-evaluation, the lack of hard-set structure, fewer deadlines, and classroom changes caused problems for the less-disciplined students. The teacher's lack of experience working as a leader/facilitator was challenging. The difficulty of changing roles, from teacher-directed classroom manager to the reverse role as leader/facilitator, was difficult. That difficulty may have reduced the contrasts expected in the progress of the students.

Another delimitation was that the same person taught both groups, which might have resulted in greater enthusiasm expressed toward the experimental group's activities, though the researcher made a great deal of effort not to do so.

The instructor's experience with total quality management was a trial-by-fire experience, often developing unfamiliar classroom management methods in a less-than-confident atmosphere. Glasser's non-coercive system was difficult to introduce to a student population accustomed to being educated with a stimulus-response reaction to problems that accrued in class. The first weeks were filled with students testing this concept, before settling down to apply their effort to class objectives. Teaching the students about different classroom management systems consumed a week of class time. As David Langford explained about his TQM teaching experience, the introductory time spent reviewing questions, such as why students were in a class, what did they want from the course, what would be the barriers to their success, and what would it mean to complete the course with quality, provided students with a sense of their importance and the relevance of their studies (Schmoker & Wilson, 1993). These same questions, discussed in group A's class, provided them with the mindset to begin the process of

student self-management. However, it took a longer time for the group to feel confident enough to go ahead with the work on their projects.

Meanwhile, some students in the control group were beginning to complain that students in the experimental group were being treated better: they were being given the freedom to decide how the class should be run. The idea that some students in the control group were given detention time, while their peers in the experimental group were not, frustrated some students. At the beginning of the semester, all the students were advised that an experimental study was being conducted, but as one student from the experimental group exclaimed, "We didn't know that the Deming method was going to be fun; we thought it was just some school thing." The excitement provided by the experimental group made it difficult not to carry the excitement of working as a facilitator to the control group. This could have affected the attitude of the instructor when reverting back to strict, teacher-directed management for the control group. A number of the students commented that the instructor "softened up a bit" towards the end of the semester.

Conclusions

Prior to the start of the study, teaching experience using the traditional stimulus-response system made the experimenter better-equipped to use this system when the study first began in the classroom. It was easier to deal with the control group, which forced students through fear to do their work; if they earned time after school for misbehavior, they would have to come to the Home and Auto classroom to serve their time, thus giving them a second or third try at the learning process. This helped them

overall toward taking the posttest, and achieving a higher final score. More time spent teaching this way, rather than just spending time preparing to teach using lead management, gave the control students a learning advantage, and perhaps this made them just as successful as the experimental group. If a student from the control group earned after-school time, he/she learned better with repeated information. If a student from the experimental group learned better, it was because he/she was not penalized for turning in an assignment late, but completed (when it was turned in) with quality. Both groups of students did learn the curriculum.

One intangible quality of this study was that students in the experimental group helped each other with educational objectives, reducing the time spent by the experimenter making sure quality learning was being achieved. This time was not measured or used in this study. Also, there were differences in the amount of time needed by the experimenter to compare procedures used to teach and motivate the two groups. These time differences were not reported in this study.

The subject matter of technology education lends itself to lively exchanges of ideas about the intangibles of this study, and providing the rich source of active learning found in technology education programs today. The hands-on base skills needed to perform home repairs could allow a larger percentage of students, not just the gifted academic students, to achieve feelings of success. For example, in the experimental group A, contributions from those students not regularly considered positive resources in student/team structures produced a cooperative atmosphere where everyone could feel part of the team.

The student discussions after the posttest were extremely informative, although not formally measured in this study. A re-evaluation of approach would provide additional information on student attitudes and reactions, and should be addressed in a follow-up study.

The overall reaction of group A toward the classroom management change was positive. They enjoyed the idea of ownership of class rules, working as teams, and reviewing and evaluating their own work for quality. They felt that the concept of having a chance to re-work mistakes, and still receive a top score, was rewarding. The fact that students were not punished with lower grades if projects were handed in late was really appreciated. As one student expressed, "What's the point of handing in an assignment and putting in all the work to do a good job, if just because you did it two days later, it was only worth half as much?" Another student said simply, "I've got a life besides school." These expressed reactions reinforce Glasser's contention that coercion develops the opposite reaction in students than would be expected. These statements remind us all that students come from diverse family economic levels. The bitterness often felt by these students makes it plain that school is not pictured in their minds as a *quality* place, so that at least one of their five basic student needs, according to Glasser, is not satisfied (Glasser, 1986).

The news of a different approach to teaching traveled throughout the student body. Near the end of the school year, a number of students stopped in at the instructor's office to ask if the Glasser/Deming method was going to be used in other classes that he would be teaching the next school year; if it was, they were going to change their

schedules to include a technology class. That was great news for a teacher of elective offerings.

Some suggestions for further research, based on the findings and conclusions of this study, include a time study from the aspect of teacher's time spent preparing to teach using Glasser's approach, as well as studying the amount of time students need to adapt to a different teaching system that introduces them to self-management. Another area of further research might be to study how motivation about school is improved through satisfaction about projects that can achieve a level of quality because of student input and self-evaluation. Another area of further research might be in the area of teaching group dynamics, and how the achievements of a group can affect individual levels of self-esteem.

Last, a recommendation would be to repeat the study with the control group engaged in some other activity while the experimental group learns about Deming/Glasser.

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Appendix A

Home and Auto Pretest

This measurement is a sample test to rate your home and auto maintenance experience. It will not be included in your class grade.

1) The _____ and the _____ are considered the most

expensive rooms in a home.

2) Before you can build or undertake a major remodeling task you must obtain a

_____ from your local government.

3) What are the three major improvements that must be present on an improved lot?

A. _____ B. _____ C. _____.

4) Almost all municipalities require buildings to meet building _____.

Safety

5) True or false: Fire destroys more homes than any other natural disaster.

6) True or false: The correct ladder angle against a vertical wall is

¼ the distance of the extended length of the ladder.

7) True or false: A wooden ladder is recommended to be used near electrical

power lines or transformers.

8) True or false: Electrical power tools without a proper ground wire are

safe to use.

9) True or false: Safety glasses are not required when nailing.

10) Match the fire extinguisher to the type of fire to be controlled:

Class A.   Class B.   Class C.   Class D.

1. Electrical fires: Extinguisher _____

2. Fires of flammable liquids, gasses, and grease: Extinguisher

_____

3. Fires of combustible metals such as magnesium, titanium, zirconium,

sodium, and potassium: Extinguisher _____

4. Fires of ordinary combustible materials such as wood, paper, cloth, and

rubber: Extinguisher _____

Tools

11) Name three types of power saws used in home repair:

A. _____ B. _____ C. _____

12) Multiple choice: The blade of a framing square is 24 inches long. How

long is the tongue?

A. 10 inches

B. 12 inches

C. 16 inches

D. 20 inches

13) The backsaw is used for fine cabinetwork. It usually has:

A. 8 teeth per inch

B. 10 to 12 teeth per inch

C. 14 to 16 teeth per inch

D. 18 to 20 teeth per inch

14) Use the drawing below and read the rule to the nearest 1/8 inch.

a. 0-A _____

b. 0-B _____

c. 0-C _____

d. 0-D _____

e. 0-E _____

f. 0-F _____
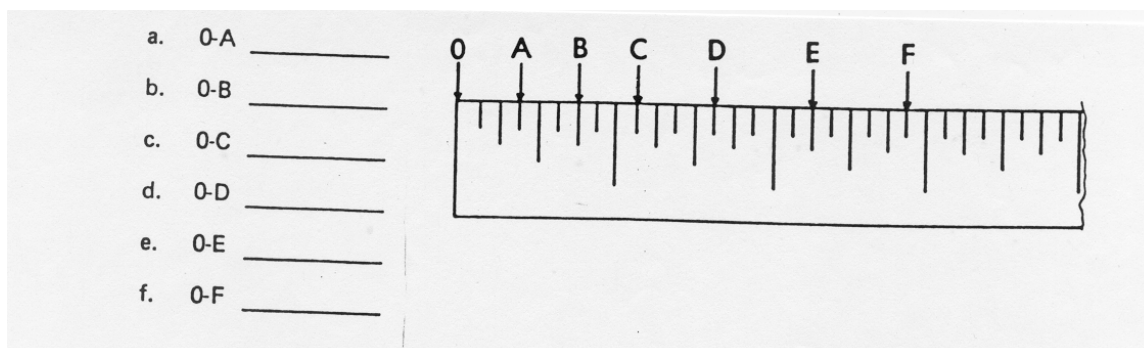
Electrical

Fill in the blank.

15) When connecting wires to terminals, black wires should be connected to

_____ colored terminals on outlet receptacles and the white wire

should be connected to the _____ colored terminals.

16) Circuit breakers and fuses protect wiring systems from _____ and

_____ circuits.

17) Connecting two colored wires and the white wire in a 3-wire circuit provides

_____ number of volts.

18) For most house wiring jobs, copper wire numbers _____ and

_____ are specified by the building plans.

19) Match the terms in the column at the left with proper definition on the right:

A. Alternating current   1._____ Unit of measurement of electrical pressure

B. Amperes   2._____ Unit of measurement of electrical current

C. Direct current   3._____ Unit of measurement of how much electricity is

D. Kilowatt hour   being used

E. Ohms   4._____ Unit by which electricity is metered

F. Resistance   5._____ Unit of measurement of electrical resistance

G. Switch   6._____ Tendency of conductor to keep electric current

H. Volts   from passing through it

 I. Watts   7._____ Device for controlling current by opening or

                                         closing circuit

                                 8._____ Current flowing in one direction only

                                 9._____ Current flowing first in one direction, then in the

                                         other

Plumbing and Heating

20) Place the following steps for replacing a faucet washer in the order in which you

    should complete them, 1-7, with 1 as the first step.

    _____ A. Remove the cap nut from the faucet.

    _____ B. Remove the handle from the faucet.

    _____ C. Put back the stem, cap nut, handle, and the decorative cover.

    _____ D. Replace bib screw.

    _____ E. Close shut-off valve that controls the flow of water to the faucet.

    _____ F. Remove the washer and select a new one of the same dimensions.

    _____G. Place the new washer on the stem.

21) True or False: When using a plunger to unclog a drain, fill the sink or tub

                with two or three inches of water.

22) True or False: A toilet seat can be replaced using an adjustable wrench as

                the only tool.

23) True or False: The toilet bowl has what is called an external trap.

24) True or False: The main purpose of a drain trap is to slow the draining of

liquid to keep the pipes from banging.

Fill in the blank.

25) Name three common fuels used in home heating systems

   A. _____ B. _____ C. _____

26) Forced-air heating systems have _____ to trap dust in the

   heated air.

27) If the flame of a gas furnace is burning properly it will be _____ in

   color.

Auto

Multiple Choice. Circle the letter of the best answer.

28) The lubricating oil used in automotive engines:

   A. Helps cool the engine.

   B. Produces a better seal between piston rings and the cylinder walls.

   C. Carries contamination away from moving parts.

   D. Reduces the friction produced from the moving parts.

   E. All of the above.

 29) Oil with the rating of 10w-30 is a

   A. Single- viscosity oil

   B. Multi-viscosity oil

   C. Straight-weight oil

D. Two oils that are mixed

E. All of the above

30) The lead-acid storage battery converts _____ energy to

_____ energy.

A. Heat, to chemical

B. Chemical, to electrical

C. Electrical, to heat

D. Chemical, to heat

E. Electrical, to chemical

31) If a tire is marked P195/75R14, the P indicates:

A. The load carrying capacity of the tire

B. That it is a passenger car tire

C. The speed rating of the tire

D. None of the above

32) Describe the sequence of events that are taking place for each of the

pictures, A-D of a four-cycle engine. (Use the back of this paper).
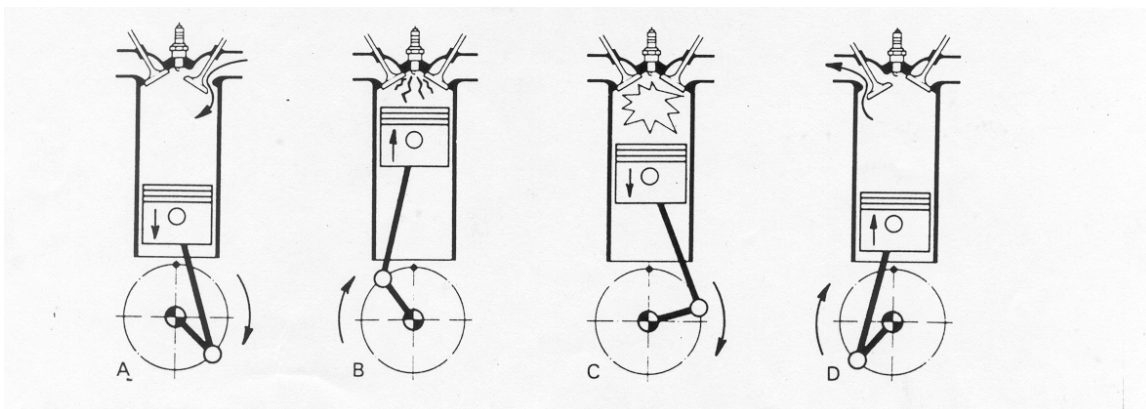
Appendix B

Glasser's Guidelines for Quality Schools

Glasser's system uses the philosophy of Deming to work towards motivated students doing useful work. There are six conditions of quality schools and schoolwork:

1. There must be a warm, supportive classroom environment. This can't be achieved if an adversarial relationship between teacher and student exist. Students need to trust their teachers, be able to talk and to discuss ideas. Under no circumstances should anyone coerce another.

2. Students should only be asked to do useful work. All work should make sense; it must fit into some use, aesthetic, artistic, intellectual or social. Students should not be forced to memorize something that will soon be forgotten.

3. Students are always asked to do the best they can do. Quality work takes time and effort; teachers will provide time for students. Most students are used to either traveling too fast or too slow in academic classes.

4. Students are asked to evaluate their own work and improve it because quality work, good as it may be, is never static. As Deming says, quality can almost always be improved.

5. Quality work always engenders self-esteem. Quality always feels good for everyone involved; teachers, students, and parents are consumers of education; personal achievement, whether through hard work or obtained as a bargain hunter at a rummage sale, is satisfying.

6. Quality work is never destructive. Therefore, achieving good feelings through the use of addictive drugs or to harm people, property, or the environment, which belongs to all of us, does not meet the definition of quality work (Glasser, 93).

Appendix C. Comparison of Pretest, Posttest and Final Grade

Group A (Experimental Group)				Group B (Control Group)		
Pretest	Posttest	Gain		Pretest	Posttest	Gain
1. 48	58	+10		A. 42	56	+14
2. 37	49	+12		B. 38	50	+12
3. 40	47	+7		C. 43	47	+4
4. 51	61	+10		D. 48	55	+7
5. 38	52	+14		E. 37	49	+12
6. 42	58	+16		F. 42	61	+19
7. 51	63	+12		G. 51	65	+14
8. 56	67	+11		H 50	61	+11
9. 48	63	+15		I. 44	46	+2
10. 37	39	+2		J. 53	62	+9
11. 42	51	+9		K. 47	51	+4
12. 44	58	+14		L. 30	34	+4
13. 37	35	-2		M. 48	55	+7
14. 41	41	0		N 36	33	-3
15. 43	51	+8		O. 59	64	+5
16. 56	57	+1		P. 44	43	-1
17. 40	59	+19		Q. 39	46	+7
18. 42	46	+4		R. 62	41	-21
19. 44	51	+7		S. 59	66	+7
20. 31	34	+2				