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ABSTRACT

This report briefly introduces the ideas of six influential individuals in the field of quality control, and relates these concepts to current educational innovations. Quality is defined by Philip B. Crosby as the result of a culture of relationships within an organization. W. Edwards Deming espouses intrinsic motivation for all employees, consistency of purpose, and consistent quality improvement. Armand V. Feigenbaum proposes integrating quality development, maintenance, and improvement efforts of groups within an organization. Kaoru Ishikawa emphasizes full participatory management. Joseph M. Juran stresses the "project approach" wherein solution schedules are developed as problems are identified. Taiichi Ohno's contribution is to eliminate waste in the deployment of people by developing teams and team leaders. The point is made that systems do not operate in isolation from their host communities. Dr. Deming's PDSA (Plan Do Study Act) cycle is used as an example of a quality process. Seven basic quality control tools and seven management and planning tools are described that help people organize and analyze facts, opinions, and political realities as part of the decision-making process. Total Quality Management is used to examine recent educational initiatives: site-based decision making, effective schools, strategic planning, outcome-based education, and contract schools. The 1993 work "Toward Quality in Education the Leaders' Odyssey," developed by the National LEADership Network study group on restructuring schools, places Deming's 14 points under 8 headings and compares varied educational innovations and initiatives in that context. The total systems approach is urged as the tie used to interface innovations and initiatives that schools and school districts adopt. This paper contains 89 references. (RAH)

THE CONCEPTS OF QUALITY
FOR
RURAL AND SMALL SCHOOL DECISION MAKERS[1]

by

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This paper was presented on October 24-25, 1994 at the sixteenth annual Rural and Small Schools Conference, Kansas State University, Manhattan, Kansas.

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The purpose of this paper is to: 1. define the concept of "quality" from the perspective of various important people; 2. present, briefly, the concept of total systems; 3. present one quality process (plan, do, study, act) used by Deming and introduce a sample exercise (affinity) used by "quality" people ; 4. present a discussion of quality schools, some of which are rural; 5. present a brief discussion of varied innovations being used in schools as they relate to the "quality" concept; and 6. present references (reading, other media, and human) which rural and small school decision makers may use as they apply the "quality" processes in their school or district.

Selected Important people

Philip B. Crosby

His most read work is Quality is Free, Mentor Books, New American Library, NY. 1979. Among his other works is Let's Talk Quality, 96 Questions you Always Wanted to Ask Phil Crosby, McGraw-Hill, N.Y. New York, 1989.

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Crosby expressed concern about American products lacking durability. He defined quality as conformance to requirements and further felt that the measurement of quality is the price of non-conformance. Crosby clearly believed that the best way to cause quality was prevention as imbedded in the concept of "doing it right the first time." The statement "zero defects" is often attributed to him.

Crosby identified a 14 step Quality Improvement Process (not to be mistaken for Deming's 14 Points of Management) which included:

1. Management Commitment
2. Quality Improvement Team
3. Measurement
4. Cost of Quality
5. Awareness
6. Corrective Action
7. Zero Defects Planning
8. Employee Education
9. Zero Defects Day
10. Goal Setting
11. Error Cause Removal
12. Recognition
13. Quality Councils
14. Do It All Again

Crosby articulated the belief that quality is the result of a culture within an organization which is built upon relationships. The relationships must be carefully developed since they are delicate and vulnerable. If leadership teams are willing to build exceptional relationships and learn to make the necessary changes that cause quality implementation to occur, then quality services/products can quite easily be produced.

W. Edwards Deming

Among the quality works by or about Deming are:
W. Edwards Deming, Out of the Crisis, Massachusetts Institute of Technology Center for Advanced Engineering Study, Cambridge, Mass. 1986.
Mary Walton, The Deming Management Method , Perigee Books, a division of Putnam Publishing Group, New York, 1986.
William W. Scherkenbach, The Deming Route to Quality and Productivity, CEEP PRESS Books, Washington DC., 1992.

W. Edwards Deming was born on October 14, 1900, and grew up on a homestead in Wyoming. Edwards was a well-behaved and studious child who was given the nickname "the professor." Although somewhat serious, he did enjoy camping and fishing.

In 1917, W. Edwards Deming went to Laramie, Wyoming, to begin his education at the University of Wyoming. During his college years he worked as a janitor, soda jerk, shoveled snow, and cut ice. He also sang in the choir and played the piccolo in the university band. Following his graduation in 1921 he remained at the university for an additional year studying mathematics and teaching physics.

Mr. Deming went to Yale in 1924, receiving a Ph.D. in physics. He then worked for the Department of Agriculture and from there was employed with the Census Bureau. In 1946, he left the Census Bureau and established a private practice as a statistical consultant. He also joined the faculty at New York University as a professor at the Graduate School of Business Administration, teaching sampling and quality control.

Following the war, Dr. Deming's services were in demand overseas. In 1946, he traveled twice to Greece for the State Department to observe the Greek elections. In 1947 he also visited India and Japan.

In 1947, Dr. Deming was recruited by the Supreme Command for the Allied Forces to help prepare the Japanese census. During his stays in Japan, Dr. Deming made it a point to become a part of the culture of Japan.

Three years later Dr. Deming was invited to lecture in Japan on quality control methods. By the end of his stay, he had given his lecture to most of the managers in Japan. In his lectures Dr. Deming would tell the Japanese that they could control the free-trade markets in five years. The Japanese actually accomplished this goal in four.

From 1950 through 1960 Dr. Deming watched the Japanese produce products which were marketed throughout the world, while at the same time he watched the United States market decrease. Finally in 1980 Dr. Deming was "discovered" in America. Television producer Clare Crawford-Mason was producing a documentary for NBC on American ingenuity and needed a person behind the story. Through contacts she was told of W. Edwards Deming. Because of the documentary Dr. Deming was thrust into the public limelight in America and became highly sought for his consulting work. Among Dr. Deming's clients were Honeywell, AT&T, Campbell Soup, Ford, General Motors, Hughes Aircraft, and Dow Chemical of Canada.

Dr. Deming espoused the concepts of intrinsic motivation for all employees, consistency of purpose, and continuous quality improvement. He used 14 Points for Management to describe his worker based philosophy. The points are:

1. Create consistency of purpose for improvement of products and services.
2. Adopt the new philosophy of quality.
3. Cease dependency on mass inspection to achieve quality.
4. Improve constantly and forever the system of production (quality products) and service.
5. Institute on the job training and retraining.
6. Institute leadership, which is the job of management.
7. Don't award business on price tag alone.

8. Drive out fear.
9. Have teamwork, break down barriers between departments.
10. Eliminate slogans, exhortations, and targets for the workforce.
11. Eliminate numerical quotas and goals.
12. Remove the barriers that allow pride of workmanship. Such barriers include merit pay, MBO and the like.
13. Institute a vigorous program of self-improvement and education for everyone.
14. Put everyone in the organization to work in accomplishing the transformation.

Armand V. Feigenbaum

Dr. Feigenbaum is credited with the phrase "total quality control" which lead to a classic textbook by that title. He felt that total meant every function and activity within the organization. His definition of Total Quality Control is that of integrating the quality development, maintenance and improvement efforts of groups in an organization. The organization will then enabled production and service which allows for full customer satisfaction at the most economical level. Dr. Feigenbaum was the first person to introduce the idea of integrating quality throughout the organization.

In discussing quality circles he stated that such visible techniques often clothe management's attitude. Too often managers in North America attempt to implement quality circles without understanding the unrelenting application of attitude by management toward worker. The attitude within the quality framework must be one of honest teams. Structures must support both quality teamwork among departments and the quality work of individuals.

Feigenbaum's subsystems for Total Quality Control are:
1. Quality Evaluation at Preproduction
2. Quality Planning of the Product and Process

3. Quality Evaluation and Control of Incoming Materials
4. Quality Information Feedback
5. Quality Technology/Information Equipment
6. Quality Development of Human Resources Through Training and Development
7. Quality Service During the Postproduction Period
8. Management of the Quality Control Function
9. Special Quality Studies

Kaoru Ishikawa

Professor Ishikawa was in the forefront of the Japanese quality movement from its beginnings. At his death in 1988 Mr. Ishikawa was president of Musashi Institute of Technology in Tokyo. He has received the Shewhart Metal, the Deming prize and the Grant prize for his exceptional contributions to the development of quality control theory, principles, techniques, quality circle activities, and efforts in standardization. He has efforts which enhanced quality and productivity throughout the world.

Professor Ishikawa believed that Total Quality Control (TQC) was the way to insure open channels of communication within an organization. He felt that this openness allowed for truthful, frank and honest interchange which then allowed for early detection of problems and decreased the tendency to falsify data for short term gains. He further believed that those doing the work understood the problems and thus are the key players in providing solutions.

Ishikawa clearly communicated a need in organizations for respecting humanity, full participatory management, making data based decisions, breaking down the barriers of sectionalism, consumer first, quality first and long-term orientation. Most authors credit Mr. Ishikawa with the concept of respect for all as evidenced by Quality Circles. Thus he emphasized full participatory management.

Joseph M. Juran

J. M. Juran is founder and Chairman Emeritus of Juran Institute, Inc., a firm which provides consulting services to various industries, companies, government agencies, and other institutions. Dr. Juran is also in great demand as an international lecturer. His Quality Control Handbook has become the foundation source for quality improvement efforts throughout the world. One book by him published in 1989 is a valuable read. It's title, Juran On Leadership for Quality, is published by The Free Press, a division of Macmillan Inc., New York.

Dr. Juran began his illustrious career in the early 1950s in Japan where he was studying the Japanese approach to quality and conducting training sessions in managing for quality. For the next 25 years there was little demand for Dr. Juran's approach to quality management. However, during the late 1970s there was an increased interest in the quality topic and thus Dr. Juran formally structured his notes into a seminar which has been revised and updated on a continuous bases.

In the 1980's there was a massive interest in his quality-management seminars. These seminars expanded into not just open seminars, but also in-house seminars given to over three hundred companies. Dr. Juran continues to update his materials in this rapidly-changing world and continues to provide valuable input into the area of quality management.

Dr. Juran stresses what he calls the "project approach" wherein solution schedules are developed as problems are identified. He has emphasized servicing the customers need, elimination of chronic waste, spending resources on the "vital few" areas, and fitness of use.

His Quality Trilogy is the model from which his beliefs about quality are best expressed. One dimension is Quality Planning, the process for preparing to meet quality goals. Another is Quality Control, the process for meeting quality goals during the ongoing efforts. The third

is Quality Improvement, which is the process for breaking through to unprecedented levels of performance.

Taiichi Ohno

Mr. Ohno is a very modest, self taught man who developed the "just in time" concept for Toyota. The process has become the basis for "lean production".

The basis of Mr. Ohno's belief was to eliminate waste, particularly in the deployment of people. He eliminated foreman and instead developed teams with a team leader. The team did almost all functions, including housekeeping and covering for absent workers. He developed the concept of continuous quality improvement, which included time for the team to work with the engineers developing the products/processes. He also developed the "five whys", which through systematic "why" questioning traced errors back to their root causes.

Systems Theory
A Brief Overview

Einstein, writing on page 31 of The Evolution of Physics,(1938, Simon and Schuster, NY.) stated,, "... to understand reality we are somewhat like a man trying to understand the mechanisms of a closed watch. He sees the face and the moving hands, even hears it ticking, but he has no way of opening the case. If he is ingenious he may form some picture of a mechanism which could be responsible for all the things he observes, but he may never by quite sure his picture is the only one which could explain his observations. He will never be able to compare his picture with the real mechanism, and he cannot even imagine the possibility of the meaning of such a comparison." This quote describes theory. Theory is a logical way of combining concepts, assumptions and generalizations in a way that describes, predicts and guides practice.

The purpose of this section is to present the reader with a framework for understanding how the quality paradigm fits. The

concepts of quality are not isolated. They address a set of interrelated concepts and generalizations that provide an explanation of what has happened and what may happen in organizations.

When studying systems from an open-systems perspective one finds that organizations have planned and unplanned features; rational and irrational characteristics; and formal and informal structures. They are complex and dynamic and are composed not only of an organizations mission but of people who have their own needs, interests and beliefs. It is not practical to make isolated changes in an organization without considering how they impact the total system.

The consideration of the total system assists the practitioner in applying the principles of quality. Schools do not operate in isolation. Forces are operating within and without the school. Examples include educational associations, colleges, politics, taxpayers, laws, economics, legislatures, cultures, accrediting agencies, demographics and regulatory agencies and electricity. Any action school leaders choose to take, or not take, has impact on other parts of the structure.

For example, if one introduces a daycare facility within a school it impacts directly on potential student dropouts, spatial needs, community involvement, the mission of schooling, human resource planning, legal regulations and the like. When reviewing the concept of quality one would be well advised to insure some understanding of the total system.

For an in-depth treatment of theory, and more specifically systems theory, the reading of Educational Administration: Theory Research and Practice, by Wayne K. Hoy and Cecil G. Miskel (1987, Random House, NY.) is recommended. Although other quality writings for school leaders are available the authors have however found the the Hoy and Miskel writing most informative.

Applying a Quality Process

Plan Do Study Act (PDSA) Cycle

Since the introduction of the modern school organization, the basic functions of the management have been planning, organizing, staffing, directing, and controlling. These fundamental building blocks have been the backbone of school administration. However, there has been increased pressure in recent decades from global competition, technological development, and demographic shifting to cause a breakdown in efficiency of these basic functions. The effect has been paramount. These inefficiencies have raised many important questions in the way Western management philosophy perceives their functions. Dr. Deming's impact to correct these inefficiencies has been experienced worldwide. His systems orientation has helped organize these basic functions in a less theoretical and more applications-oriented process.

The simplest form of continuous process improvement is the Plan-Do-Check-Act (PDCA) cycle. When Dr. Deming began training the Japanese executives in the summer of 1950, he presented the PDCA cycle as the Shewart Cycle. Dr. Walter Shewart had been Dr. Deming's mentor at Bell Laboratories during the 1920's. However, the Japanese soon renamed it the Deming cycle. Deming actually changed the emphasis in the PDCA Cycle to the Plan-Do-Study-Act (PDSA) cycle. He wanted to emphasize the importance of learning in the continuous improvement process.

The first phase of the PDSA cycle is to develop a **plan**. This planning stage is not new to the educational community. However, there are some basic concepts which enhance the school system's ability to utilize its resources better. The initial concept which impacts the planning process is *effectiveness*. It is how well the process or project meets the requirements of the individuals who are going to use it. It measures the quality of the process. Second, *efficiency* is how well the resources in the process are being used. Third, *adaptability* helps frame the efficiency and effectiveness of the process in the long term picture. The trilogy of effectiveness, efficiency, and adaptability help the planning

stage have specific, measurable outcomes. Once they are quantified, the team has a specific situation analyzed.

It is important to note that in most problem solving efforts the participants of the team often jump immediately to generating lists of problems and solutions without consulting the data. The planning phase does not do this. Several other activities occur first. There is no specific protocol but common planning activities involve developing a hypothesis about the issue, defining the current situation, and communicating with all the participants of the system being studied. The emphasis is on gathering solid, reliable facts and figures. This part is preeminent. Without it, the team loses direction. Dr. Deming had a saying on his desk which said "In God we trust, but all others need data."

Common areas of investigation for continuous improvement are people, materials, equipment, methods, and environment. As these areas are analyzed different tools to evaluate the situation are utilized. These tools help segregate ideas into clearer issues and eventually a plan develops. The effectiveness and efficiency of the proposed plan will be specific and quantifiable. These plans must be for the long term benefit of the school or else the change is not adaptable for future use. It is not unusual to find 50% of the teams' time spent in the planning phase of the PDSA cycle.

Once the plan has been developed, the **do** phase follows. Depending upon the scope of the project, process, or problem, this phase requires different implementation strategies. First, the plan could be totally implemented. A second option could be a pilot test of the proposed solution. A third variation could be a mixture of the first two strategies. Caution must be exercised in this phase because changes are being made. Liabilities need to be minimized.

It is not uncommon to have an unusually high commitment from the team surface at this stage. There is a definite team expectation of the outcome for the proposed change. School leaders needs to be totally aware of the data gathered, the proposed plan, and the current standing of the implementation of the change. Team success does not depend upon the specific project outcome alone. The human experiences during the PDSA cycle many times supersedes the achievements of the actual project!

During the do stage, data must be collected and monitored. The nature of the information will be obvious because the team has gathered the pertinent facts during the previous stage. As the data is gathered and displayed, the tools will tell the quality story. If the team has been empowered to utilize their full capacity in the development of the solution to the study's issues, data will automatically drive the outcomes of the do stage. It is a dynamic process. This phase usually takes 30% of the time.

The **study stage** of the PDSA cycle compares the effectiveness and efficiency results of the two previous stages. Adaptability can be determined as the data is compared. It is important to emphasize that the data has been gathered as a result of the PDCA cycle. The team did not gather the information retroactively. Therefore, there will be a whole new feeling among those involved. The study of the "before" analysis and the "after" solutions will have a positive impact on the team. This portion takes about 15% of the total project time. Team learning has truly taken place. The participants gathered the information, decided upon a plan, implemented the plan, measured the results and now have analyzed them. Empowerment has begun!

After the third phase has been studied, the team charts an act phase. If the project was successful, the team institutionalizes the changes. The project's data serves as documentation for the next team who will analyze the situation. Standardization occurs as the project's benefits become permanent changes in the school's culture. If the project needs continuous improvement, the team moves forward with the improvement methods agreed upon by leadership and the team. This process truly never ends.

Graphically, the PDCA model usually looks like this:

Act Plan

Study Do

The PDSA cycle seems to be very basic thus many novices miss the subtly of the process. Dr. Deming's insight help clarify the subtlety. First of all, it turns real power and authority to a group of individuals. Leadership and the team becomes partners as their mutually, interdependent process develops. Secondly, the 85% - 15% rule impacts the outcome's capacity. The rule states that 85% of all variation comes from the system or process itself. 15% comes from other facts. Four to six percent of the 15% comes from human error. Therefore, the people in the process are NOT at fault. The system is! Thirdly, data becomes the foundation for decisions instead of poor planning and politics. The last and most significant impact is the human issues it emphasizes. Turf battles, comfort zones, and personal habits are challenged. The PDSA cycle may appear simple but the human element makes it both complex and challenging.

To summarize, the PDCA cycle helps redefine the five basic functions of the classical management model. It improves the planning, directing, staffing, organizing, and control functions so that all groups of activities add value at all times, at all levels, and by every one. Too many times our decisions impact many parts of our schools' systems, but there is no one accountable to monitor the decisions' impact on the effectiveness, efficiency, and adaptability of the whole school system.

As a school district progresses with the PDSA cycle, more complicated models may develop. There are deviations of the PDSA cycle. Typically, they are called by some number such as a 7, 12, or 14 step continuous improvement process model. Each school district needs to evaluate its own situation to decide the process which best fits their need. This is typically referred to as process management.

Tools for Plan-Do-Study-Act Cycle

Opinions can be like rusty, old bolts. Everybody has one but many of them are obstinate and hard to work with. As for the rusty bolt, one must use WD - 40, a good wrench, leverage, and physical strength to loosen it. However, most opinions are not that cooperative. The purpose of tools for continuous quality improvement is to enable

individuals and teams to communicate and solve problems more effectively and efficiently.

Educators have used many of these tools for years. Unfortunately, familiarity with the tools is only the beginning of their application. As one works with these tools, it occurs that perhaps clear thinking and cooperation could replace many of them. However, these tools do help many different opinions come together with a common problem and search for a data-driven solution.

Data-driven solutions are important to understand. One must search, cultivate, refine, and process information before data-driven solutions are proposed. The solutions are not always obvious. However, tools help everyone understand both the objective and subjective issues. Data-driven solutions are the opposite of political opinions which have subjective solutions as an outcome. Political issues of a subjective nature are used later and become part of the teams consideration as they search for their data-driven solution.

The tools come from many different subject areas. Statistics, computer science, logic, philosophy, critical thinking, and quality control have used the tools as a part of their subject's roots. However, for the sake of solving problems, one must focus on the universal transfer of tools from all areas rather than focus on the narrow application from any one. PROBLEMS NEED TO BE SOLVED BY ALL PEOPLE REGARDLESS OF THEIR SUBJECT ORIENTATIONS. Therefore, it becomes critical for all team members to minimize their negative attitudes towards any subject they disliked from previous experiences. There is minimal memorization, a great amount of help from experienced users, and the team members help one another learn from information provided through the tools.

Tools are typically categorized into at least four categories. Tools from the seven basic quality control tools, the seven management tools, advanced tools, and decision-making tools will be discussed in each section. Seven is used in two groupings because the Japanese made

popular those sets of tools. Seven is a lucky number in Japan because it is the minimum number of pieces of equipment a samurai warrior carries into battle.

Seven Basic Quality Control Tools

Goal/QPC has a handy product called The Memory Jogger for Education. It is pocket size and costs less than $8. The Juran Institute has a similar product called The Quality Improvement Pocket Guide. The Goal/QPC product is more popular but the Juran Institute product does a better job of integrating problem solving and which tool to use under different circumstances. The tools are flowcharts, cause and effect charts, check sheets, Pareto chart, run and control charts, scatter diagram and histogram.

Flowcharts

Flowcharts are a graphic portrayal of the steps in a process. Many different activities can be presented in this process. Tasks, decisions, and boundaries of process are examples of a few of the different activities. One specific type of flowchart is the deployment flowchart (other versions are at times called a integrated or a functional flowchart). The deployment flow chart not only includes WHAT is being done but WHO is going to do it. This has been an important tool for service organizations such as schools.

Cause and effect chart

The cause and effect chart (sometimes called a Fishbone diagram or Ishikawa diagram) graphically establishes the cause and effect relationships with your issue. Many times, it is used to clarify the output of a brainstorming session.

Check sheet

Check sheets help answer the question "How often is something happening?". It is a form of a tally sheet. Once the data is gathered, Pareto charts, histograms, and control sheets help evaluate the data.

Pareto chart

Pareto developed a composite diagram to help determine and prioritize what problems to solve. A histogram and a run chart are put together to help graphically analyze the biggest problems and its impact on the whole solution.

Run and control charts

Run charts are usually time-sequenced samples of quality issues. They are easy to construct and are used to see positive or negative trends of a particular characteristic of the process. Control charts are a specific kind of run chart. Statistical measurements are added to the run chart to help determine the process statistical measurements. Dr. Deming and Dr. Shewart originated this area of quality control usually called Statistical Process Control (SPC).

Scatter diagram

A scatter diagram is a picture of the relationship between two processes or variables. It shows their direction and strength. It is used in statistics to help understand the correlation of two variables.

Histogram

Histograms give a graphic view of the amount of variation within a process. It is a bar graph that shows the frequency distribution of a data set. The Pareto chart uses a histogram as part of its measure.

The Seven Management and Planning Tools

Mike Brassard's book The Memory Jogger Plus is a invaluable resource when one chooses to learn how and when to use these seven tools. The seven management tools emphasize better communication, relating a common understanding to operational planning, and meeting the customer's needs by including them into the planning process.

Affinity diagram

Affinity diagram is a brain storming method used to gather large amounts of data efficiently using ideas, facts and opinions. It can be used effectively when team members are not familiar with each other or a heterogeneous group is having difficulty discussing sensitive issues.

Interrelationship diagram

Used many times after an affinity diagram has been developed, it creates complicated cause-and-effect relationships and/or complex objectives-to-means relationships. This tool points out the importance of planning and the sequences of steps to a plan.

Tree diagrams

The tree diagram is also called flow tree diagram or systemic diagram, Once the affinity and interrelationship diagram is used, the tree diagrams helps breakdown the process improvement steps into their lowest practical level. This tool is used to clarify thinking, organize complex issues, and highly sensitive consequences if they are present (e.g. safety or legal issues). This tools helps confirm the general to specific logic of the process improvement.

Prioritization matrix diagrams

After the tree diagram has been developed, the key issues and action options must be narrowed down. This process helps prioritize tasks, issues, and possible options based on known, weighted criteria. It is a mathematical process called the consensus criteria method which helps prioritize and streamline the implementation process.

Matrix diagram

This diagram is used when two or more sets of ideas, issues, or options are compared. It shows the logical connecting points and the strength can be indicated too.

Process diagram program chart (PDPC) analysis

The PDPC analysis enables organizations to map out events and scenarios which can occur during the implementation and the necessary contingencies. It is used when the task is complex and the failure rate is potentially high. The contingencies are included to help identify and correct the direction of the implementation efforts.

Activity network diagrams

Activity Network Diagrams is a scheduling tool which helps plan the most appropriate method of scheduling complex tasks. Subtasks need to be familiar with known duration. Critical projects of organizational importance use the method to insure little margin of error in the actual vs. estimated time to completion.

Advanced Quality Control Tools

These advanced tools are used to analyze special problems and/or complex issues. They include design of experiments, Taguchi method, factor analysis, regression analysis, multivariate analysis, discriminate analysis, canonical correlation, cluster analysis, and sample plans.

Decision Making Tools

These tools can be used in a variety of ways. It is not uncommon to use the seven quality control tools and the seven management tools throughout the process; however, the decision making tools more directly bring the individuals' opinions and feelings into the process. Multi-voting, the nominal group technique, and negotiation help refine the complicated decision making process when groups of individual try to decide important issues.

Summary Statement for All Tools

In summary, these tools help people interact with objective facts, subjective opinions, and political realities. Many times the team will compile the series of tools together in a book form and will have the documentation for their decision. David Langford of Langford and Associates developed a tool called the Probletunity Flow Chart . It takes its name from the concept that each problem is an opportunity to grow! The Probletunity Flow Chart meshes Deming's Plan Do Study Act cycle and all tools used at each stage of the cycle. The quality story gives each team something tangible and specific to be proud of. Administration has a standardized, documented process to work with as an outcome instead of a list of recommendations. When the probletunity flow chart is used in the classroom, each student has a portfolio to show as an outcome of the process improvement project. For educators using tools gives a positive, consistent way of teaching these important skills to tomorrow's decision makers.

Quality and Its Relationship To Selected Educational Innovations

A number of initiatives have become prevalent during this past decade. Among them are site based decision making, effective schools, strategic planning, outcomes based education, and contracted schools. The concept of Total Quality Management is an umbrella which allows each of the before mentioned areas, as well as all other educational initiative, to be covered. A 1993 work has been developed by the National LEADership Network Study group on restructuring Schools titled Toward Quality in Education the Leaders Odyssey. Funded by the Office of Educational Research and Improvement, and sold by the US. Government Printing office, Mail Stop SSOP, Washington DC 20402-9328. In the work the design team places Deming's fourteen points under eight headings (factors) and then compares varied innovations/initiatives.

When reviewing **Consistency of Purpose** they felt such applied to effective schools work, strategic planning, and outcomes-based education. It usually does not apply to site-based decision making as defined in the literature.

Customer-Driven Service was the second identified factor. It applies to the effective schools and outcome-based education. It does not generally apply to site-based decision making or strategic planning.

In presenting **Counting for Quality** the design team presented information which showed that for effective schools, strategic planning, and outcomes-based education, all were quality driven. Site-based decision making may or may not be in sync with the concept.

When discussing the factor of **School and District Culture** it was explained that site-based decision making and effective schools does fit this factor. Outcome-based education, strategic planning and contracted schools does not.

Collegial Leadership fits with site-based decision making, effective schools and strategic planning. The factor doesn't fit with outcome-based education.

When analyzing the factor of **Decentralized Decision Making** site based management fits. Effective schools, strategic planning and outcome-based education does not.

Continuous Improvement is a factor congruent with strategic planning and outcome-based education. It does not fit the concept of site-based decision making. Effective schools, according to the design team also does not fit. The authors of this paper feels it does.

None of the initiative fits with Comprehensive Perspective. **Total Quality Management** is the only comprehensive initiative discussed by the design team that could be used as an umbrella concept.

After reviewing the four initiative presented by the design team it becomes clear that the total systems approach (discussed as "quality", "total quality management" and the like) must be the tie which is used to interface the varied innovations and initiatives that schools and school districts proceed through. Schools of today must embrace the requirements of leadership, concern for employees, innovation, waste reduction in all forms and competitiveness as they progressively move into the future. If not schooling will fall further and further behind until failure is inevitable.

References
Total Quality Management
Wilson and Hedlund

Books

Aguayo, Rafael. (1990). Dr. Deming: The American Who Taught the Japanese About Quality. New York, NY: Simon & Schuster.

Albrecht, Karl (1992). The Only Thing That Matters: Bring the Power of the Customer into the Center of Your Business. New York, NY: Harper Business.

American Association of School Administrators. (1991). An Introduction to Total Quality for Schools: A Collection of Articles on the Concepts of Total Quality Management and W. Edwards Deming. Arlington, VA: AASA.

American Association of School Administrators. (1992). Creating Quality Schools. Arlington, VA: AASA.

Bonstingl, John Jay (1992). School of Quality: An Introduction to Total Quality Management in Education. Alexandria, VA: Association for Supervision and Curriculum Development.

Bounds, G., Yorks, L., Adams, M., & Ranney, G. (1994). Beyond Total Quality Management. New York, NY: McGraw Hill.

Bowles, J. & Hammond, J. (1991). Beyond Quality. New York, NY: Berkley Books.

Bradley, Leo H. (1993). Total Quality Management for School. Lancaster, PA: Technomic Publishing Company.

Brassard, Michael (1988). The Memory Jogger. Methven, MA: Goal/QPC.

Brocka, Bruce & Brocka, M. Suzanne (1992). Quality Management: Implementing the Best Ideas of the Master. Homewood, IL: Business One.

Byham, W.C. (1992). Zapp! In Education. New York, NY: Lawcett Columbine.

Byrnes, Margaret A., Cornesky, Robert A., & Byrnes, Lawrence W. (1992). The Quality Teacher: Implementing Total Quality Management in the Classroom. Port Orange, FL: Cornesky and Associates Press.

Byrnes, Margaret (1994). Quality Fusion: Turning Total Quality Management Into Class. Port Orange, FL: Cornesky & Associates.

Cook, William J. (1988). Bill Cook's Strategic Planning for America's Schools. Arlington, VA: America Association of School Administrators.

Covey, Stephen R. (1991). Principle-Centered Leadership. New York, NY: Summit Books.

Crawford-Mason, Clare. (1994). Creating a Quality Company: Applying the Deming Philosophy. New York, NY: Random House, Incorporated.

Creech, Bill (1994). The Five Pillars of T.Q.M. New York NY: Truman Talley Books/Dutton.

Davidow, William H. & Uttal, Bro. (1989). Total Customer Service: The Ultimate Weapon. New York, NY: Harper & Row.

Deal, Terrence E. & Kennedy, Allen A. (1982). Corporate Cultures: The Rite and Rituals of Corporate Life. Reading, MA: Addison- Wesley Publishing Company.

Deming, W. Edwards (1986). Out of the Crisis. Cambridge, MA: MIT Center for Advanced Engineering Study.

Deming W. Edwards (1992). Quality, Productivity, and Competitive Position. Atlanta, GA: Handbook for seminar.

Dobyns, Lloyd. (1994). Thinking about Quality: Progress, Wisdom & the Deming Philosophy New York, NY: Random House, Incorporated.

Drake Telbert L. and Roe, William H. (1986). The Principalship. New York, NY: Macmillan Publishing Company.

Drucker, Peter (1966). The Effective Executive. New York, NY: Harper and Row.

Dunn, Robert H. (1993). TQM for Computer Software. New York, NY: McGraw-Hill.

Fields, Joseph C. (1993). Total Quality for Schools: A Suggestion for American Education. Milwaukee, WI: American Society of Quality Control Quality Press.

Fields, Joseph C. (1994). Total Quality for Schools: A guide for Implementation. Milwaukee, WI: American Society of Quality Control Quality Press.

Fullan, Michael G. & Stiegelbauer, Suzanne (1991). The New Meaning of Educational Change. New York, NY: Teachers College Press.

Greenleaf, R.K. (1977). Servant Leadership: A Journey into the Nature of Legitimate Power and Greatness. New York, NY: Paulist Press.

Hofstetter, Fred T. (1994). Multimedia Presentation Technology: With a Sample Presentation. Belmont, CA: Wadsworth Publishing Company.

Hubbard, Dean L. (1993). Continuous Quality Improvement: Making the Transition to Education. Maryville, MO: Prescott Publishing Company.

Juran, J.M. (1989). Juran on Leadership for Quality: An Executive Handbook. New York, NY: The Free Press.

Juran, J.M. (1993). Quality Improvement Pocket Guide. Wilson, CT: Juran Institute.

Kaufman, Roger, & Zahn, Douglas (1993) Quality Management Plus: The Continuous Improvement of Education. Newbury Park, CA: Corwin Press, Incorporated.

Langford, David P. (1993). Total Quality Learning. Langford and Associates: P.O. Box 80193, Billing, MT 59108-0133. Phone 406-652-7509. Fax 406-652-7555.

Lewis, Ralph (1994). Total Quality in Higher Education. Delray Beach, FL: Saint Lucie Press.

Mahoney, Francis X. (1994). The TQM Trilogy: Using ISO 9000, the Deming Prize & the Baldridge Award. New York, NY: A M A C O M.

McCormick, Betty L. (1993). Quality & Education: Critical Linkages. Princeton Juction, NJ: Eye on Education.

Morgan, Colin (1994). Total Quality Management in the Public Sector. Washington, DC: Taylor & Francis, Incorporated.

Murgatroyd, Stephen (1992). Total Quality Management & the School. Washington, DC: Taylor & Francis, Incorporated.

Neuroth, Joann. (1992). Total Quality Management TQM Handbook. Arlington, VA: American Association of School Administrators.

Peters, Thomas J. & Waterman, Robert W. (1982). In Search of Excellence: Lessons from America's Best-Run Companies. New York, NY: Harper & Row.

Petrick, Joseph. (1994). Total Quality in Human Resources. Delray Beach, FL: Saint Lucie Press.

Sallis, Edward (1992). Total Quality Management in Education. Washington, DC: Taylor & Francis, Incorporated.

Schenkat, Randy (1993). Quality Connections: Transforming Schools Through Total Quality Management. Alexandria, VA: Association for Supervision and Curriculum Development.

Scherkenbach, William (1986). The Deming Route to Quality And Productivity. Milwaukee, WI: American Society of Quality Control.

Schmaker, Michael J. & Wilson, Richard B. (1993). Total Quality Education. New York, NY: Phi Delta Kappa.

Sheridan, Bruce M. (1993). Policy Deployment: The TQM Approach to Long-Range Planning. Milwaukee, WI: American Society of Quality Control Quality Press.

Siegel, P. and Byrne, S. (1994). Using Quality to Redesign School Systems. Milwaukee, WI: American Society of Quality Control Quality Press.

Snyder, Neil H. (1993). Vision, Values & Courage: Leadership for Quality Management. New York, NY: Macmillan Publishing Company, Incorporated.

Spanbauer, Stanley J. (1992). A Quality System in EducationAmerican Society of Quality Control Quality Press.

Spendolini, Michael J. (1993). The Benchmarking Book. New York, NY: American Management Associations Communications.

Walton, Mary (1986). The Deming Management Method. New York, NY: Perigee.

Weekes, Evelyn N. (1992). Total Quality Management: An Approach to Outcomes Assessment. Guthrie, OK: Midwest Publications.

Wilson, Paul (1994). Performance Based Assessment: External Internal and Self Assessment. Milwaukee, WI: American Society of Quality Control Quality Press.

Woodall, Jack (1994). Total Quality in Information Systems. Delray Beach, FL: Saint Lucie Press.

Journals

Abernathy, Patricia E., & Serfass, Richard W. (1992) One district's quality improvement story. Educational Leadership, 50(3), 14-17.

Bayless, David L., & others. (1992). The quality improvement management approach as implemented in a middle school. Journal of Personnel Evaluation in Education, 6(2), 191-209.

Bender, Robert H. (1991). Total quality transformation tools sculpt better handle on system. School Administrator, 48(9), 24-26.

Betts, Frank (1992). How Systems Thinking Applies to Education. Educational Leadership, 50(3), 38-41.

Blankstien, Alan M. (1992). Lessons from enlightened corporations. Educational Leadership, 49(6), 71-75.

Bonstingl, John Jay (1992) *The total quality classroom.* Educational Leadership, 49(6), 66-70.

Brandt, Ron (1992). On Deming and School Quality: A Conversation with Enid Brown. Education Leadership, 50(3), 28-31.

Glasser, William (1992). The quality school curriculum. Phi Delta Kappan, 73(9), 690-694.

Gilbert, James P., & Rojewski, Jay W. (1993). Continuous quality improvement for special populations: Strategic planning for successful program implementation. Journal for Vocational Special Needs Education, 15(3), 25-31.

Herman, Jerry (1992). Total quality management basics: TQM comes to school. School Business Affairs,58(4), 20-28.

Mawhinney, Thomas C. (1992) Total quality management and organizational behavior management: An integration for continual improvement. Journal of Applied Behavior Analysis, 25(3), 525-43.

McLean, Gary N. (1993) Applying continuous quality improvement principles in secondary school vocational education, with emphasis on special populations. Journal for Vocational Special Needs Education, 15(3), 19-24.

McCload, Willis B., Et. Al. (1992). Toward a system of total quality management. ERS Spectrum, 10(2), 34-41.

Melvin, Charles A., III, (1992). A Wisconsin consortium turn to total quality system improvements. School Administration, 48(9) 19-20,23.

Melvin, Charles A. III (1991). Restructuring schools by applying Deming's management theories, Journal of Staff Development, 12(30), 16-20.

Murgatroyd, Stephen. (1991). Strategy, structure and quality service: Developing school wide quality improvement. School Organization, 11(1), 7-19.

Rapport, Lewis A. (1993). A school - based quality improvement program. NASSP Bulletin, 77(554), 16-20.

Rhodes, Lewis A. (1990). Beyond your beliefs: quantum leaps toward quality schools. School Administrators 47(11), 23-26.

Rhodes, Lewis A. (1990). Why quality is within our grasp.. if we reach. School Administrators 47(10). 331-34.

Rhodes, Lewis A. (1992). On the road to quality. Educational Leadership 49(6), 76-80.

Rocheleau, Larrae (1991). How one superintendent learned the difference between managing and leading. School Administrators, 48(9) 14-16, 18.

Senge, Peter (1990). The leaders new work: building learning organizations. Sloan Management Review, 32. 7-19.

Senge, Peter (1992). Building learning organization. Journal for Quality and Participation, 15(2) 30-38.

Siu-Runyan, Yvonne & Heart, Sally Jo, (1992). Management Manifesto. Executive Educator, 14(1), 23-26.

Smith, Franklin L. & Stevenson Jr., Zollie (1992). A student centered approach to assessment. NASSP Bulletin, 76(545), 77-81.

Tomervik, Karen (1993). Creating and sustaining inclusive organizations through continuous quality improvement. Journal for Vocational Special Needs Education, 15(3), 32-39.

Wilson, Richard B. & Schoker, Mike, (1992). Quest for quality. Executive Educator, 14(1), 18-22.

Other Resources

Bates, Richard. (1981). "Management and the Cultures of the School." In Management of Resources in Schools: Study Guide I, edited by Richard Bates and Course Team. Geelong, Australia: Deakin University.

Burnham, Joan & Hord, Shirly (1992). Total Quality Management: Where does it fit in the Instructional Picture. Presentation at the American Association of School Personnel Administrators' Annual Conference. San Antonio, TX. October 19-21, 1992.

Burnham, Joan, Hord, Shirley & Roberts, Laraine (1992). Total Quality Management: A Fad or Fit with other Educational Initiatives. Presentation at Governor Richard's Conference, November 9-10, 1992.

Spady, William G. (1991). Implementing Outcome-Based Education. Presentation at the Association for Supervision and Curriculum Development Professional Development Institute. Austin TX.

Tribus, Myron (1992). Quality Management in Education. unpublished paper. Hayward, CA: Exergy, Inc.

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