

Curricular Implications for Participative Management in Technology Education

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Carl Harshman (1982) believes the United States may be experiencing the most significant change in the work place since the Industrial Revolution. The movement involves a transformation from the traditional, bureaucratic style of management to a more participatory relationship. This new philosophy, known as participative management, attempts to improve the utilization of human resources by involving individual workers in decisions affecting their work.

The growth of participatory and work innovative programs such as quality circles, participative management, and employee involvement has taken place in America since the early 1970s. The concept, which has experienced considerable success in other countries, is currently being implemented in both industrial and non-industrial settings. While only a small fraction of U.S. work places are currently governed by a participative management model, the rate of transformation from a traditional bureaucratic model is accelerating (The Indiana Labor and Management Council [ILMC], 1985). Future indicators predict the trend will continue as we head toward the twenty-first century.

America's Most Valuable Resource

Management is beginning to recognize people as America's most valuable resource, a resource of untapped talent capable of solving problems and making decisions. Involving employees in decision making has become a significant trend in the American work place. Corporations each year spend over \$40 billion to train their employees and develop their management staffs (Weischadle & Weischadle, 1987).

The Indiana Labor and Management Council (ILMC) (1985) recently discovered that employee participation increases productivity, work quality, worker satisfaction, employment security, and organizational flexibility. Participation enhances the degree to which a member takes pride in his/her job, and feels a personal responsibility for the outcome of the work.

The development of successful employee involvement requires a basic change in the way people within an organization relate and deal with each other.

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Such a change requires all participants to develop the proper cognitive and affective skills and attitudes to contribute in a participative work setting.

A 1985 study by the ILMC revealed that most workers lack the necessary skills to be contributing members in participative work situations. Skills such as problem solving, communications, math and logic, and coping with conflict are but a few of the essential skills identified in the study. The study also revealed that little is being done in the vocational and technical schools in Indiana to prepare students for participative work settings because they do not teach these skills (ILMC, 1985). It is assumed there are many other states in the nation with the same dilemma.

As the change in management philosophy unfolds, it appears something needs to be done in the secondary and post-secondary schools, and colleges and universities in America to better equip students with the proper cognitive and affective skills and attitudes regarding employee involvement.

Implications of Participative Management in Technology Education

Historically, the name of the technology education discipline has changed several times to reflect the direction of the profession. Within the last 25 years the content has also been through some dramatic changes. Digital electronics, CAD/CAM, and robotics are just a few of the content areas being incorporated into technology education programs. One thing that has remained constant throughout the years, however, is where the content is derived. Contemporary technology education programs draw their content from industry and technology, a policy that is unique to the discipline. As technological changes occur, the profession attempts to incorporate these changes into the public school and university programs in order to better prepare students for a constantly changing society. One of the most significant changes currently taking place in both industrial and non-industrial settings is the philosophy toward management of human resources.

In 1982 the New York Stock Exchange did an extensive survey of 49,000 U.S. companies employing 41 million people. The study provided a comprehensive profile of the employee involvement effort taking place in America. The survey described a movement in its developmental stage with enormous potential. Eighty-two percent of the corporations surveyed by the NYSE felt that participative management was a "promising new approach," compared to three percent who felt it was "just a passing fad" (McKendrick, 1983). The report (New York Stock Exchange [NYSE], 1982) recommended improved workforce productivity through educational programs in secondary schools, better training of young managers, and more employee involvement in decision making and financial gain sharing.

The Carnegie Report recommends a study of technology by all students. Ernest L. Boyer, president of the Carnegie Foundation for the Advancement of Teaching, has this to say:

We can and must help every student learn about the technology revolution, which will dramatically shape the lives of every student. And it's here that the industrial arts educator has a crucial role to play. (American Industrial Arts Association, 1985)

Technology education is faced with an opportunity to prepare students for participative work settings and should incorporate this into the existing curriculum.

Purpose of the Study

The purpose of this study was to identify and validate a list of worker characteristics necessary for participative management. These cognitive and affective skills can be used in planning, organizing, and developing technology education programs to prepare students to be contributing members in work-group situations. The study validated worker characteristics in order of importance as perceived by selected industrial personnel. Therefore, in planning curriculum, emphasis can be placed on those characteristics from highest to lowest priority. The primary objectives of the study were to:

1. provide information on worker characteristics in industrial participative management to be used in planning, organizing, and developing technology education programs;
2. provide information to determine whether current technology education programs are preparing students for participative work settings;
3. better inform technology education teachers and curriculum developers of the participative management philosophy;
4. provide information that can be used to better prepare students with the cognitive and affective skills and attitudes for participation.

Methodology

A survey was conducted of 38 randomly selected industrial personnel, who function as training directors, employee involvement coordinators, and others interested in the participative management concept. The participants were chosen from a data base of members in the Association for Quality and Participation (AQP), formerly the International Association of Quality Circles. The assumption was that since this group was so close to the training process they could provide the most accurate data. The members of the sample group were employed by companies ranging in size from 150 to 13,000 employees.

The Delphi process was the research technique used to gather the necessary data. The opinions of the group were solicited three times, through survey instruments, in order to arrive at a group consensus. The three-round process was used in anticipation that each round would further refine the list and validate the data.

The initial data collection instrument included a list of worker characteristics for industrial participative management, constructed on the basis of a review of literature and research, and consultation with specialists involved in

work innovative programs. Faculty members from the School of Business, School of Education, and School of Technology at Indiana State University involved in teaching the participation concept were also asked for assistance.

In the process of developing the instrument, doctoral students in curriculum and instruction and selected faculty members at Indiana State University were asked to review the initial draft to assure clarity of items and instructions. For further clarity, accuracy, and validation the instrument was then submitted to a small group of training directors involved in employee involvement programs for their review.

A coefficient of correlation was used to determine the reliability between responses on the first and second round instruments. When tested, using a t-test, all the responses proved to be significantly different from zero at the .05 level of probability. A high positive correlation between the first and second round instruments was revealed by the analysis.

The Delphi technique for collecting the data took place over approximately a five month period. The initial data collection instrument for round one included a section for collecting demographic information about the sample group and the company. It also included a section addressing research questions one and two regarding worker characteristics necessary in preparing someone to become a contributing member in a participative work setting. The section pertaining to research questions one and two was a list of worker characteristics which the participants were asked to evaluate by a five-point rating scale ranging from non-essential to essential. They also had an opportunity to list other characteristics believed to be important to the participative management concept.

The data from round one were collected and compiled in order to prepare the round two instrument. The round two instrument was designed to further validate the worker characteristics as well as gather information to answer research questions three and four. Research questions three and four pertained to those characteristics industrial personnel teach their employees and which should be taught in a technology education curriculum.

Once again, the data were collected and compiled to prepare the final instrument. The round three instrument was a rank ordering of worker characteristics along with the group mean for each one. The respondents were asked to review the list for validation. The instrument was also designed to gather additional information in answering research question four.

Of the 38 subjects who agreed to participate in the study, 28 completed all three instruments.

Results

The analysis of demographic data revealed a changing managerial philosophy from a directed (autocratic) approach to a group participatory approach. In all, 51.5% of the companies surveyed have transformed from a directed to a group participatory or delegated management philosophy within the last five years.

All but one of the companies surveyed had established employee participation groups within the last ten years. Ninety-four percent of the respondents anticipate a growth in the number of employee participation groups for their respective companies during the next two years.

Some of the reasons for electing to implement the participation concept were to: (1) improve communications, (2) improve product quality, (3) reduce costs, (4) improve employee relations, (5) become more competitive by increasing production, and (6) tap the unused potential of all employees.

In regard to worker characteristics for participative management, problem solving and communication skills were considered the most important by the sample group. The top 25 worker characteristics are listed in Table 1. These characteristics are listed in order of importance from one to twenty-five. Eleven of the first thirteen worker characteristics were directly related to problem solving and communication skills.

Other characteristics considered extremely important were team building, gathering, analyzing, and presenting data, group process, and goal setting.

Those characteristics related to problem-solving are the primary concern of industrial trainers preparing someone to participate in a work-group situation. Five characteristics, all relating to problem-solving, were taught by all the companies surveyed on the second round instrument. The characteristics were problem-solving, gathering information, identifying and selecting problem causes, generating problem solutions, and evaluating problem solutions.

Table 1

Worker Characteristics Important to the Participative Management Concept

1. Brainstorming	14. Group Process
2. Problem Solving Skills	15. Goal Setting
3. Identifying and Selecting Problem Causes	16. Implementing Change
4. Evaluating Problem Solutions	17. Recognizing and Dealing with Verbal Comm. Problems
5. Generating Problem Solutions	18. Coping with Conflict
6. Communication Skills	19. Motivation
7. Team Building	20. Patience/Perseverance
8. Gathering, Analyzing, and Presenting Data	21. Group Dynamics
9. Perception and Listening	22. Leadership Ability

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| 10. | Verbal Communication | 23. | Desire/Commitment |
| 11. | Identifying and Analyzing Problems | 24. | Consensus Decision Making |
| 12. | Gathering Information | 25. | Negotiation (Strive for win-win) |
| 13. | Displaying/Organizing and Analyzing Information | | |
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In addition, group process, group dynamics, team building, leadership ability, communication skills, identifying and analyzing problems, displaying/organizing and analyzing information, gathering, analyzing, and presenting data, and brainstorming were taught by at least 85% of the companies surveyed.

Research question 4 was asked to find out which of these worker characteristics the sample group would like to see taught in a technology education curriculum. There were very few differences between those characteristics believed to be most important and what should be taught. The top 25 worker characteristics were the same as those in Table 1 with the exception of project planning and oral presentation, replacing patience/perseverance, and desire/commitment.

Curriculum Development for Participative Management

Curriculum development for participative management in technology education programs is almost non-existent. There are three primary reasons for this neglect.

1. The concept of participative management in America is still in its infancy stage. Although the concept itself has been practiced since the early 1970s it has just recently been manifested as a viable technique for improving many aspects of the work setting.
2. Many technology education teachers are unaware of the concept and those aware of it aren't sure what should be taught.
3. Little has been done to identify necessary worker characteristics (cognitive and affective skills) to aid in planning, organizing, and developing curriculum.

The relationship of the first two problems is evident. Technology education teachers appear to be unaware of the concept partly because it is so new and partly because it is unaddressed in the textbooks and professional journals.

A review of selected manufacturing and general technology textbooks available for industrial arts/technology education teachers revealed a serious

neglect of the participative management concept. Nearly all of the reviewed textbooks, published within the last ten years, were concerned with authority administered from the top down. There was little mention of the changing philosophy toward employee involvement.

Many of the textbooks discussed problem-solving techniques, the brainstorming process, quality assurance, and statistical process control, all of which are considered relevant to the concept of participation. *Technology: Today and Tomorrow* discussed quality circles and statistical process control. *Living With Technology* dealt with quality circles and problem solving techniques. *Exploring Manufacturing*, and *Modern Industry* both discussed line and staff management. Neither *Manufacturing Processes* or *Processes of Manufacturing* made reference to involving employees in decision making. *Technology: Today and Tomorrow*, and *Living with Technology*, were the only textbooks reviewed which made specific reference to the concept of employee involvement.

A review of the professional journals for technology education such as *The Technology Teacher*, *Industrial Education*, and *School Shop* also revealed little on the topic of participation.

A few articles discussed the success of the Japanese in becoming an industrial power due to their technique of employee involvement and participation. Dillon (1984) wrote about Japanese methods for increased productivity and what American industry might learn. Sullivan (1988) discussed a quality control module for technology education with reference to quality circles and the concept of participative management.

Articles regarding the factories of the future (Walden, 1988), and meeting the employment needs in the eighties and beyond (Peckham, 1988) did make reference to the idea of involving employees in decision making. For the most part, however, the review of these particular journals over the past ten years revealed very little regarding the changing managerial philosophy.

The third point regarding worker characteristics for participation was addressed in this study. It has been discussed by a few other researchers, including the work of Little (1986), ILMC (1985), Sedam (1983), Lloyd and Rehg (1983), and Reeves (1983).

Curricular Materials and Techniques

Many businesses, industries, and consulting firms have developed training programs and materials to teach the proper skills for participation. Materials and techniques identified by several authors for use in industrial training include: histograms, graphs, control charts, flow charts, Pareto analysis, brainstorming, cause-and-effect diagrams, check sheets, decision matrices, presentation techniques, prioritizing techniques, and cost-benefit analysis (Ball, 1982; Lloyd & Rehg, 1983; Reeves, 1983; Sullivan, 1988; Torrence, 1982; and Weischadle & Weischadle, 1987). The basic quality circle problem-solving process includes: problem identification, define the problem, investigate the problem, problem analysis, choosing a solution, presentation to management, and implementation.

Most of the training materials and techniques for participative management have been developed by consulting firms or by the company that wishes to incorporate the concept. Business now runs what may be the largest educational system in the country. Weischadle and Weischadle (1987) point out that training and development costs in business now approach the total annual expenditure of all of America's four-year and graduate colleges and universities.

Very little has been done in vocational education or industrial arts/technology education programs in regard to participative management curriculum development. One of the conclusions drawn from the ILMC (1985) study was that very little is currently being done to prepare students for participatory programs. However, participatory approaches are relatively new to business and industry in this country and it is not surprising that schools have not yet developed curricula in this area (p.38).

Although very little has been done regarding participative management curriculum development, many of the important characteristics are being taught at various places in the technology education curriculum. Characteristics such as problem solving, communication skills, team building, group process, and many others are incorporated in technology education classes. These skills are extremely important to the concept of participative management and it might be a good idea to label them as such when they are included in various curricula.

Summary

Based on the findings of this study, the concept of participative management is expected to grow in industrial organizations over the next few years. The worker characteristics identified can be used in planning, organizing, and developing technology education programs to prepare students to be contributing members in work-group situations.

As technological changes occur, the profession has made a gallant effort to incorporate these changes into public school and university programs. As if new technologies such as robotics, CAD/CAM, lasers, and superconductivity are not enough, the profession is faced with yet another challenge, the changing philosophy toward management of human resources.

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