Maryland Technology Teacher

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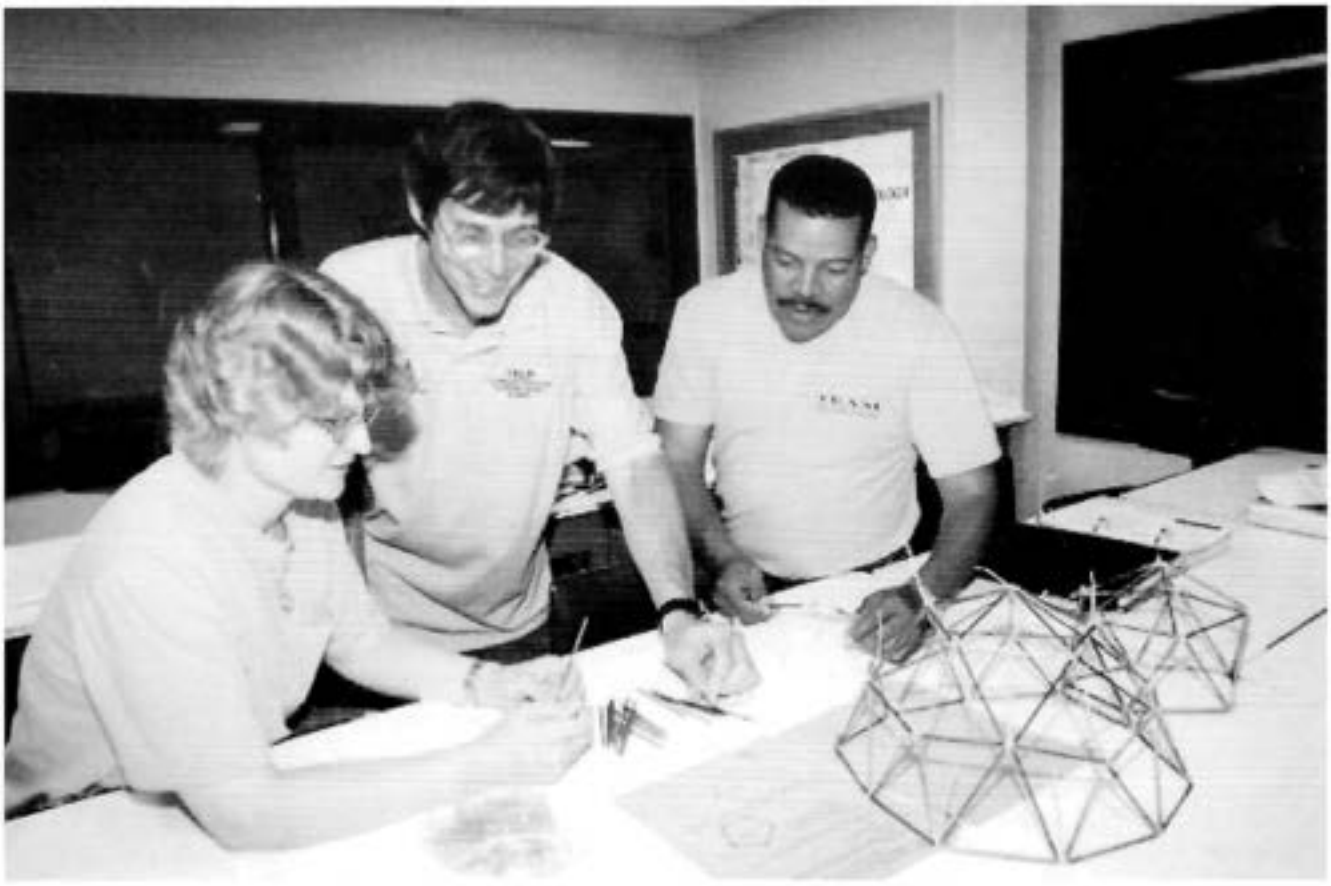

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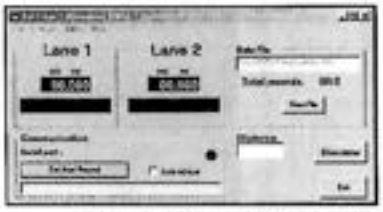

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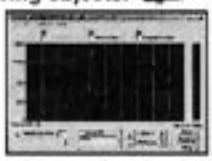

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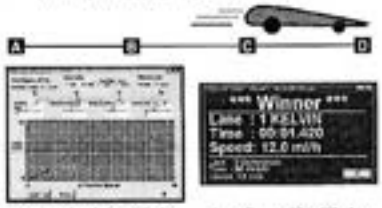

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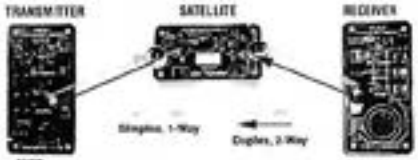

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TEAM

Maryland Technology Teacher

Journal of the Technology Education Association of Maryland

Vol. 2 **Winter 2000**

In This Issue:

The Maryland Technology Teacher is the official publication of the Technology Education Association of Maryland (TEAM) with executive offices at the Baltimore Museum of Industry, 1415 Key Highway, Baltimore, Maryland 21230.

President's Message

Adam Sheinhorn

As we enter the next millennium, it's important that we reflect on the tremendous progress that has taken place. As a state, Maryland has made tremendous strides in making the transition from Industrial Arts to Technology Education. We have recognized what is required to achieve success, and we have worked towards attaining it. Over the past couple of years I have seen Maryland's technology education community come together as a team to maintain a level of excellence that has come to be expected from leaders in our field. Developing the Technology Education Leadership Project (TELP), the Emergency Certification Program, and the Master's program in Technology Education are shining examples of how Maryland Technology Education is building the foundation for the future. As I begin my tenure as president, let my first action be to acknowledge the hard work and dedication demonstrated by our technology educators. The hours of preparation that go into teaching Technology Education can be extreme, but the impact our educators make on the lives of our students is immeasurable. As you know, each year we honor teacher excellence at our Donald Maley Excellence in Education Teacher Recognition Program. A small sample of our teaching community is recognized for their achievements in teaching Technology Education. Let me be the first to say that as we honor these teachers for their accomplishments, we are honoring the entire Maryland technology education teaching community. We have come as far as we have because we have a cadre of teachers that is second to none. As we move into the next millennium, continue to strive for excellence. Continue to be the leaders in our profession and the teachers of our future leaders. I urge you to get involved with TEAM - volunteer on a planning committee, be a district representative, or just be there to help out from time to time. Opening the lines of communication and collaboration between the counties will only strengthen us as a profession and a family. I look forward to working with all of you in the upcoming year.

Maryland Technology Teacher

Journal of the Technology Education Association of Maryland

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TEAM
Technology Education Association of Maryland

This is the winning design in TEAM's Logo Contest. It is the work of Harold Nacion, a 1999 graduate of Seneca Valley High School in Montgomery County, Maryland.

Leadership: The Art of Polishing and Liberating

Robert E. Wenig

Two men were discussing leadership in a cartoon appearing in The Wall Street Journal and finally one said to the other, "What we need is someone to tell us what to do." One thing we do know is that the most successful teacher or leader (T or L) is not built upon mere hard work, intelligence or ability. In fact, after reviewing hundreds of publications on teachers and leaders their greatness emerges more through the art of polishing and liberating others.

THE ART OF LEADERSHIP

Let's begin our discussion by relating a true story by Max De Pree, then the son of the young manager and the Chief Executive Officer (CEO) of the famed Herman Miller Furniture Corporation.

It was the 1920's and furniture production machines were not run by individual electric motors, but belt driven pulleys from a central drive shaft. Power for the drive shaft was provided by a steam engine which got its steam from a boiler. Sawdust and scraps from the machine room fueled the boiler that powered the steam engine. The result was a superbly efficient cycle.

The key person was the millwright, whose assignment was to oversee the entire operation. One day the millwright died. The young manager (Max De Pree's father) of the furniture factory thought it appropriate to visit the family of the key person. The widow invited him into the living room. After a period of awkward conversation, the widow asked if it would be all right for her to read some poetry. The young manager agreed. She went into another room and came back with a bound book from which she read selected pieces of poetry. When she finished the young manager commented on how beautiful the poetry was and asked who wrote it? She replied her husband, the millwright, was the poet.

Max De Pree said, in his 1989 book Leadership is an Art, "...to this day we wonder; was he a poet who did millwright work or was he a millwright who wrote poetry" (p. 9). Certainly, every human being (student or worker) has special gifts and talents that the typical teacher/leader does not know. A word of caution must be sounded for gifts and talents that are not universally applicable. That is, a dolphin is as unique as a cactus but don't ask a dolphin to survive Death Valley.

The story of the millwright illustrates two vital leadership points for technology education. First, leadership begins and ends with people. The effective teacher/leader understands and values the fact that all humans have diverse interests, motives, and desires. Recently it has been rediscovered, what the master teacher has always known, that the best leaders are able to discover and use the special gifts, talents, and skills of each person. The result, an enormous jump in performance of individuals and the organization plus it becomes a fantastic place to work and grow.

When the leader recognizes and uses diversity it provides meaning, fulfillment, and purpose of life to all people in the organization. James McGregor Burns, winner of the Pulitzer Prize and National Book award on his 1978 book, Leadership, adds a poignant comment about the moral foundation of leadership in the organization when he said, "... we will consider as truly legitimate only those acts of leaders that serve ultimately in some way to help release human potential now locked in ungratified needs and crushed expectations." The secret to technology education's future success lies in its leaders and/or teachers taking advantage of the "polishing and liberating the whole person" found in offices, laboratories, and classrooms. Kanter (1983) in her profound book titled, The Change Masters, adds "...take advantage of the talents of the people and ...begin to treat people as contributing individuals rather than an anonymous mass...."

Max De Pree's father started the legacy at Herman Miller by showing an appreciation for the dead millwright by visiting his family. That small beginning to show a concern for people and their diversity has elevated the furniture corporation to be named one of Fortune magazine's ten best run companies plus being listed as one of the one hundred best companies to work for in America.

Question, how important is it to be appreciated? Schwartz (1983) surveyed 6600 people from all walks of life, levels of education, ethnic backgrounds, and geographic areas in the United States and Canada and found a surprising answer to two questions. First, 97.2 percent said they did not receive as much praise, approval, and appreciation as they thought they deserve. Second, 98.4 percent stated that they would perform their job better if they received more praise, approval, and appreciation. How would technology educators respond to these two questions?

SERVANT LEADERSHIP

During my early research and writings about leadership I came across one of the most powerful and fascinating concepts called Servant Leadership by Robert K. Greenleaf (1977). Hailed as the grandfather of the modern empowerment movement, Greenleaf described true leaders as those who serve others first. Recently, the Indianapolis Business Journal stated, "Servant leadership has emerged as one of the dominant philosophies being discussed in the world today." Dennis Tarr (1995) identified four reasons why one should use the servant-leadership process:

1. It works because the servant leader really cares about others in creating team spirit.

2. It reinforces the nature of one's profession and calls upon its more noble instincts.

3. It is action-oriented, meaning full involvement.

4. Servant leadership is a commitment to the celebration of the people and their potential.

It is the posted journey of the gifted teacher-leaders that propel others to higher and higher levels of mutual trust and betterment. Servant-first means that polishing and celebrating is the art to leadership in the classroom or in the boardroom. Further, nothing can improve your human condition more than helping others. A recent news report from Biloxi, Mississippi powerfully illustrates this point by making life worth living.

A young woman, who was a 24-year-old dancer, jumped from a bridge in an attempt to commit suicide. As she put it, "I was tired of living." A young man saw her jump from the bridge and splash into the cold water. Forgetting that he couldn't swim, he pulled off his coat and leaped to save her in a blind response to helping a fellow human being. He began to thrash about in the water and was in serious danger of drowning when the young dancer, her own despair momentarily forgotten, began to paddle her way towards him. As he was gulping water and gasping for breath she grabbed hold of him and pulled him to safety. At the crucial moment when she saved the young man struggling for life, her own life suddenly gained something it lacked before: purpose. What was drowned there under the bridge was her despair but not her spirit.

SUMMARY

We can summarize our discussion about leadership by stating the following: When we think of great teachers and leaders and the variety of the leadership gifts they apply, we see that the powerful concept of servant-first drives the "art of leadership in polishing and liberating" human potential. In essence, the present and future power of technology education is directly linked to the chosen teacher-leader's ability to harness the talents, gifts, and motives of students and all people in the profession.

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Robert E. Wenig *is an Associate Professor in the Department of Occupational Education at North Carolina State University.*

GRADUATE STUDY: THE MASTER'S DEGREE

Leon L. Copeland, Sr.

INTRODUCTION

After nearly a ten-year absence of graduate level study in technical education in Maryland, the Maryland Higher Education Commission (MHEC) recently approved a Master of Education (M.Ed.) Degree in Career and Technology Education to be offered at the University of Maryland Eastern Shore (UMES). The closing of the Department of Occupational and Technological Studies at the University of Maryland College Park in 1993, left a large group of technical and technology educators at the secondary level with limited opportunities to pursue graduate study and advanced professional certification in their discipline. For those who are not familiar with the role and purpose of graduate study, and may be interested in enrolling in a program, the discussion which follows will provide a brief history and typical structure for master's degree programs.

HISTORY

The history of the master's degree goes back nearly seven hundred years. Early in the thirteenth century, the title conveyed the right to teach, and the titles of master, doctor, and professor were synonymous. Later the titles master and doctor came to represent degrees that were honorary distinctions conferred for academic scholarship. However, America's early master's were highly respected as a measure of academic achievement.

According to Storr (1973) the first master's degrees in this country were awarded at Harvard College in the mid-1600's. During the colonial period, the degree continued to be awarded for one to three years of work beyond the baccalaureate. In the latter half of the nineteenth century, education reformers laid the groundwork for graduate study as it is known today. During that period the master's degree became recognized as a prestigious academic award, earned for the successful completion of substantial post-baccalaureate study (Gaffney,1994).

By the beginning of the twentieth century, master's degree programs were well established as the first post-baccalaureate degree and were offered at many American universities. Since 1945 the master's degree has evolved as a major source of innovation in higher education. Gaffney (1994) cited factors contributing to the success of the master's degree to include; different degree requirements, a variety of programs and degree titles, and an emphasis on applied research. In a recent year colleges and universities in the United States granted more than 289,000 master's degrees (Encarter,1995).

PURPOSE

The Master's degree has become the primary credential for people seeking to improve and upgrade their professional skills, as well as for those interested in changing fields. In addition, students pursue master's degrees as preparation for further advanced study and for their own personal intellectual development. Universities interact directly with business, industry, government and public education through their master's programs, and often develop curricula in response to specific local or regional interests and conditions. Because so many master's programs are designed for working professionals, master's education has led the way in the use of new technologies and approaches for the delivery of educational services, particularly at sites remote from university campuses.

The development of new and more varied master's degree programs has increased across the United States in the last twenty years. Colleges and universities have responded effectively and in a timely manner to the demand from students, professional organizations, communities, and industry for higher level training. Master's level training has proved valuable to the individual graduates and to their employers, whether in the public or private sector. Many employers are now choosing to hire graduates of master's programs, or they assist current employees in getting a master's degree while they are working, by providing release time, tuition support, or cooperative in-house degree programs sponsored and taught by a local university (Gaffney, 1994).

THE DEGREE PROGRAM

Master's degree programs fall into one of two general categories: (1) research or discipline-oriented programs designed to prepare students for scholarly or research activity directed toward the acquisition of new knowledge, and (2) practice-oriented or professional practice directed mainly toward the application or transmission of existing knowledge. These latter programs constitute about 85 percent of all master's programs, and they have assumed a prominent role in preparing students to be capable in the workplace and to contribute to their professions. In many professional fields, including public education, the master's degree is required as an entry-level credential for administrators, supervisors, managers, and practitioners.

The master's degree is awarded to students who achieve and demonstrate a level of academic accomplishment and subject mastery substantially beyond that required for the baccalaureate degree. Graduates from master's degree programs should have developed the ability to: think logically and consistently; integrate and synthesize knowledge; understand how to access knowledge and information within the discipline; write in a clear, consistent, logical manner; understand the interrelationships between their discipline and others; be aware of and know how to deal with ethical dilemmas within their profession; and apply their knowledge about the discipline to real-life situations.

At the master's level, a graduate is expected to have gained knowledge and skills which come from not only course work, research, and practice required in the program, but also from the varied experiences and perspectives brought to the program and shared by students and faculty. The specific requirements for individual students, even those working in the same field, may vary to a certain extent, depending on their pre-master's preparation and experience, as well as the research project for which the academic course work is designed to prepare them.

The program should culminate in an opportunity for students to integrate their graduate experiences and knowledge. A thesis or equally rigorous creative project, or a demanding comprehensive examination, provides an appropriate capstone experience. Since the ability to communicate in one's field is essential, all master's programs should include an opportunity for students to learn to present scholarly information in written and oral form to a variety of audiences (Gaffney, 1994).

THE UMES PROGRAM

The UMES Master of Education (M.Ed.) in Career and Technology Education is a professional degree program designed to prepare teachers to become leaders and to meet Advanced Professional Certification (APC) Standards in Maryland. To qualify for the APC Maryland teachers are required to have a master's degree or a minimum of thirty-six (36) semester hours of post- baccalaureate course work which must include at least twenty-one (21) semester hours of graduate credit. To provide statewide access, teachers who are admitted to the M.Ed. program at UMES will complete courses at UMES or the Baltimore Museum of Industry (BMI) and other University System of Maryland (USM) institutions that offer graduate courses in education. The program will offer strands in Technology Education and Occupational Education. Students will complete a state-approved course of studies including at least 30 semester hours of graduate credit with a cumulative "B" (3.0) or higher grade point average. A written comprehensive examination and a seminar/research paper will be required within the last six credits of the program. The program of studies combines career and technology education content with professional education theory and best practices to develop well-rounded professionals. Graduate level scholarship and research-based content and methods will be presented throughout the program with emphasis on utilizing various information sources including electronic media.

SUMMARY

Master's programs serve many of the educational needs of students and society that are not satisfied by baccalaureate degree programs; needs that can be met only by more advanced and specialized study in a particular field. Students enroll in master's degree programs to prepare for scholarly or professional careers, to develop more advanced discipline-based research skills or to satisfy a thirst for further knowledge. Master's degree programs will continue to produce a significant number of our teachers, administrators, social workers, librarians, scientists, business leaders, and scholars for many years to come.

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Technology Education provides students with an opportunity to explore, experiment, and, in essence, replicate the ways and means by which people of all times and places have increased their capability by ... innovating, improvising and inventing ...

J. Hammond (1991)
State College System, Massachusetts

Leadership and Professionalism: Needs and Responsibilities

Donald Maley

Note: This article appeared in ITEA's Technology Teacher in September 1985.

Leadership is that common quality that extends into practically every area of the human experience. Its embryo does not reside in a position, a title, or a rank, but in a particular type of overt performance or human involvement that emanates from the person.

- It grows out of the spirit that lies within the individual.
- It is in many instances a commitment translated into performance and reality.
- It develops out of a personal value system that achieves fulfillment in a particular relationship to others--individually or collectively.
- It is a projection of one's inner conscience towards that which exists beyond the self.
- It is that common quality that extends the uncommon nature of the human into the lives and actions of others.

The nature and qualities of leadership associated with the individual leader are based upon some fundamental concepts about the nature and responsibilities of people and their relationship with others. To establish those relationships, I would like to cite three quotations that may be found in John Gardner's book, *Excellence--Can We Be Equal and Excellent Too?*

Gardner takes this first quote from William James, and it deals with the primary wealth of nations. "The world . . .is only beginning to see that the wealth of a nation consists more than anything else in the number of superior men (and women) it harbors."(1, p. 33) The members of the technology education (industrial arts) profession are a part of that great wealth with which this nation has been blessed. And, it is a wealth that neither this nation nor you or I as individuals must dare to squander. It is a wealth from which much of the leadership will spring.

The second quote, from the same source, concerns another important concept that surely must typify efforts in achieving distinction or leadership:

. . .Very few have excellence thrust upon them. They achieve it. They do not achieve it unwittingly by "doing what comes naturally" and they don't stumble into it in the course of amusing themselves. All excellence involves discipline and tenacity. (p. 92)

Show me a Pete Rose or a Terry Bradshaw and I will show you an example of discipline and tenacity.

Show me an Isaac Stern or a Jascha Heifetz or a Rubenstein and I will show you an example of discipline and tenacity.

Show me a great teacher – an R. Lee Hornbake, and I will show you an example of discipline and tenacity.

The great achievers, whether they be in politics, arts, business, sports, industry, military, or education, all have the qualities of discipline and tenacity or they would not be there.

I am confident that as each of us in the profession pursues our leadership role and professional development, our efforts are marked by both discipline and tenacity. In the future the pursuit of excellence will demand even more discipline and tenacity from each of us.

The third quote, also comes from Gardener's book in which he is quoting Mason Brown–

Excellence is a strange bargain. Life owes us little; we owe it everything. The only true happiness comes from squandering ourselves for a purpose (p.149)

This is where leadership begins. We must be willing to identify that lofty, useful purpose that transcends the individual, and we must be willing to squander our talents, time, and energy towards the achievement of that purpose.

The beginning of leadership for anyone of us must start with purpose. The sooner we establish those lofty ideals that transcend ourselves, the sooner we will be able to move into that position of leadership.

There are two dimensions of this thought that need sharing. The first is to all members of the profession. I ask you to set that seemingly unreachable goal and then use your fine talents, tenacity, and discipline in an unrelenting quest to reach it. It is by far the best and one of the most satisfying games you can pursue. It is life's greatest opportunity.

The second charge is to the senior members of the profession. That charge is to provide all the encouragement, the stimulation, and even the resources to permit the young professionals to fulfill that which lies latent within them.

The previous citations have a special relevance for each of us. They provide a form of guideline to the wise use of the great talent that exists in the profession.

The years ahead will provide this society with some assessment on how well we have squandered our talents for purposes that extend beyond each of us out into the great and pressing needs of future generations.

With these brief remarks in mind, I will proceed with the specifics of the topic which I have divided into three parts. First, I will explore some ideas and biases I have about leadership. Following that, I will discuss the need for leadership, and finally, I will make a brief comment about some accompanying responsibilities that go with leadership.

WHAT IS A LEADER?

I had served as a project director for a leadership development project for a good number of years. Each year the project directors from universities across this nation would meet at least three times. Since we were all project directors in leadership development programs, our favorite topic for discussion was that of leadership. However, with all of that "brainpower," dozens of doctorates, and centuries of combined experience in the group, – would you believe it, we could not agree upon the meaning of the word "leader."

If we cannot agree on what is "leadership," how will we ever be able to assess our leadership programs' achievements? This naturally becomes a second unanswered issue.

But perhaps, there is an easy solution to that first issue. We will turn to our trusty *Webster's New Collegiate Dictionary*, and that is exactly what I did. Permit me to quote for you my new-found knowledge about the definition of a leader as listed in the dictionary.

. . . something that leads
. . . a newspaper editorial
. . . something for guiding a fish into a trap
. . . a pipe for conducting a fluid
. . . a blank section at the beginning of a real of film
. . . a straw boss

Well now, you can see, that conglomeration of statements leaves us no better off than when we started.

As an initial move, let's raise the question– "What is *the most important* quality of a good leader?" Some will say, "the ability to communicate," "the ability to lead," "the ability to get others to follow," "the ability to generate new ideas," or "the ability to delegate authority."

As valuable as all of these seem, it is the issue of *honesty* that is of utmost importance. Without honesty in the leader, the walls of leadership soon come tumbling down. (And we have had some very explicit examples of that happening in recent years.) Perhaps we can move more effectively into the topic by looking at some of the things a leader might do, or some of the characteristics of a leader.

Risk Takers

A leader must be willing and able to take some risks. That is to say, the non-risk taker sits securely and comfortably in a non-challenged environment, creates no waves, and doesn't have to justify any departures from the norm because they take no such action. The "I just don't want to get involved," attitude is frequently expressed in such non-risk takers.

President John F. Kennedy was fond of quoting Dante with the statement that "the hottest places in hell are reserved for those, who in time of great moral crisis, maintain their neutrality." (1963 p. xvi) Leadership knows no neutrality when it comes to great moral issues, and the needs of education in this society are great moral issues.

On the other hand, a leader, if one is to be one, must move out beyond the norm into new or different arenas of thought, deed, and action. In moving beyond the ordinary, there are the risks of failure, of ridicule, of personal loss, but also the possibility of rewards, of satisfaction, accomplishment, and recognition.

Leaders Stand Out

A leader is one who stands out among his or her peers. They are the people whose ideas, talents, skills, and capabilities are obviously in the vanguard of practice and existing performance.

This has the breadth of connotation that the possibilities for leadership among us are infinite. That is to say, each of us has a good potential for leadership if we exploit our uniqueness, or as Harold Benjamin put it – "if we cultivate our idiosyncracies." The greatness of America in each of its developmental stages was the result of the actions of personal uniqueness. This is illustrated by the Jeffersons, Franklins, Washingtons, Lincolns, Roosevelts, Edisons, Ketterings, Carnegies, DuPonts, Mitchells, Robert Pearys and Neil Armstrongs.

Leaders Take Different Forms

Leadership takes on many forms and it exists in many different places, and at many different levels. The traditional concept of the boss as the leader, the general as the leader, or the manager as the leader still exists. However, the range of leadership potential among the human population extends into infinite possibilities. Possibilities that are limited only by the extent of our differences.

As educators, one might find leadership potential in writing and publishing; in teaching; in local, state, and national associations; in international education; or education in the nontraditional setting.

A good number of the aspiring leaders in our educational programs look only in one direction: towards the position of the state director, state supervisor, superintendent, or commissioner. If we all chose those type of positions for the exercise of our leadership talents, we surely will waste most of it because there are not enough of those jobs to go around.

Leaders Are Responsible

Leadership, like freedom, must be tempered with a sense of responsibility that transcends one's lust for power, self-edification, riches, or dominance over others. For example, the leaders taking medical science into the mysteries of the origins and sustaining of life must also be aware of the consequences and responsibilities associated with it.

Likewise, leadership in new and devastating weaponry must always be cognizant of the responsibilities that surely mark every turn.

Show me a great leader and I will show you one who places purposes, people, and principle above the self.

Leadership, like teaching, requires an attitudinal framework dominated by two obsessive sets of qualities: a high degree of optimism and idealism; and a positive approach to the task at hand. These qualities must extend to what is possible in that which extends beyond the self. The presence and absence of these two forms of behavior are illustrated in the following examples:

- There is the administrator "leader" who, when faced with a new or different proposal for action, tries to search for a dozen reasons why it should not be done.
- Then there is another administrator "leader" who, when faced with the same situation, will respond by saying: "Let's see what we can do about it."

Leadership Can Be Developed

Leadership can be developed through a wide variety of practices, procedures, institutions, and organizations. Likewise, leadership may be suppressed by a variety of practices, procedures, institutions, and organizations. It is hoped that leadership as well as followership would be the obvious fruits of our practices and institutions, and that we would recognize and applaud it at all levels wherein it functions.

The need for leadership is just as persistent as is the need for progress. Leadership is actually the fuel of the engines of progress. Without leadership, the engines of progress in this society would come to a screeching halt. Show me an instance of progress, and I will show you a leader. It matters little whether it is in the field of science, space technology, political reform or civil rights, where there are leaders energizing the movement, taking the risks, and standing out among the crowd, there is progress.

The road for leadership stretches out in front of each of us. There are many options on this leadership highway, and there are many levels of travel in our journey to assume a *productive* leadership role in education.

AREAS OF NEEDED LEADERSHIP

There are numerous areas in education where we need leaders in large quantities.

- There will always be leadership potential for many bright, capable, resourceful, and imaginative people in the field of curriculum development.
- A second area is that of evaluation—student evaluation, program evaluation, teacher evaluation, product evaluation, process evaluation and so on.
- There is a great need for leadership in the effort to provide the "special needs student" with the kinds and quality of education appropriate for each of them.
- There is a great need for leadership to develop a more effective interface between school and community.
- Leadership is needed in the development of programs and educational experiences for the gifted.
- The teaching profession must demonstrate aggressive leadership in establishing a more prominent role for itself in a society dominated by industry and technology. We have not told our story nor fulfilled our potential in practice before the decision-makers in the education establishment or the legislature.
- Likewise, there is a need for the teaching profession to establish standards of performance that will require excellence and eliminate the nonproductive, uninspired, and ineffective teacher, supervisor or director. This will take a form of leadership that will be uncommon, risky, and certainly unpopular. The alternative is to let the public, the government, or some other groups take over this role.
- There is a need for leadership in achieving quality education for all persons regardless of race, status in society, ethnic origin, or physical limitations or other disadvantaged segments.
- There is a need for leadership to design and structure educational strategies to deal with the complex problems facing the teacher of today.
- As teachers and educators, there is a great need for each of us to play a much more dynamic and effective role in political and community affairs. Leadership in this area is not only an opportunity for constructive involvement, it is actually a responsibility that we must assume and pursue with vigor.

These ten areas of leadership possibilities are but a small part of the total. There are probably a dozen or other areas. But, to identify leadership opportunities, to speculate about leadership opportunities, or to talk about leadership

opportunities Is not enough. That is not where our obligations end. It must involve a kind of personal commitment to leadership and to the society we serve. While I was a student at California State Teachers College, Dr. Robert Steele, the President, impressed a charge upon the students, that I and all of us must take up: "We should leave this institution, this society, and this world a better place than we found it."

To be a member of an education profession, we have been endowed with some uncommon and unusual gifts. These gifts have set us apart, but likewise, they have their price. That price is the moral obligation to use our talents in assuming leadership roles that will be instrumental in effecting progress in many and diverse ways. It is a moral responsibility that resides within each of us. Each of us has received some generous gifts that achieve their highest purpose only when we use them for the betterment of all people. That will take leadership. Moreover, that *is* leadership. One of the important tasks that we as educators must assume is that of developing leaders. It is a mandate of increasing magnitude in a society of unprecedented changes as well as unprecedented challenge.

The development of leadership qualities in others is achieved in many and different ways. Foremost among them is the establishment of role models in the area of leadership aspiration—whether that be in politics, military, education, religion, business, industry, as a big brother or sister, or as a parent.

As educators, we too, have a role to perform and carry out as though the whole world were observing us—and, in fact, we are doing just that. However, too many in the profession have failed to become inspirational educational role models, and have thus contributed to the absence of leadership as well as teaching effectiveness.

We have lost much of our potential for leadership simply because we lost the vision of what education in these United States is all about, and because we, the educational profession, have not fulfilled that same function of education that we were charged with carrying out in the development of others.

The goal of education in these United States was set forth in 1776 in the Declaration of Independence—and that was the goal of individual fulfillment, the achievement of the promise within each person.

As each of us vigorously pursues that great ideal, we will, in fact, establish a form of leadership based upon a role model that transcends all the speaking and rhetoric about the need for, and the qualities of leadership. We will, by our own examples, become leaders. Yes, leaders in the greatest of all human endeavors, leaders in the development of people.

LEADERSHIP AND PROFESSIONALISM

This final section is devoted to the relationship between leadership and professionalism. There is no way that we can separate leadership from professionalism in education. The true professional in education is a leader who is constantly trying to push back the frontiers of ignorance—whether that be in the classroom or in the research center.

The true professional who constantly strives for the pursuit of excellence in his or her area of work is indeed a leader. This fact must be so obvious as we examine the educational community in terms of those who "hold a job in the profession" as compared to those who "diligently pursue their calling with a sense of dedication and commitment to the ideal of excellence." And excellence not for self-aggrandizement, but as a sense of commitment to the society.

Leadership and professionalism are both symbolized by an unusual form of personal commitment that reaches into the realm of people and conditions beyond the self. We have educated too many so called "professionals" whose principle concerns are centered around the ignominious perspective, "What's in it for me?"

I would counter that perspective with the idea that the stature of a great leader and a great professional is what one brings to the table of life and not what one takes from it.

It is important that educators, leaders, and professionals, accept the larger, greater and more challenging sphere of human interaction that extends beyond the self to each and every student and to the broader concerns of society. As we search for identity in the profession or in a leadership role, we will find it is our relationship with that which is beyond the self that will assist in establishing meaning to the lives we live, and the opportunity for leadership and professionalism. As John Gardener put it—

Each kind of meaning implies a relationship between the person and some larger system of ideas or values, a relationship involving obligations as well as rewards. In the individual life, meaning, purpose and commitment are inseparable. When a man succeeds in the search for identity he has found the answer not only to the question, "Who am I?" but to a lot of other questions too: "What must I live up to?" What are my obligations?" "To what must I commit myself?" (p.103)

Another commonality between the leader and the professional is the matter of standards with respect to the performance of the work of each—with respect to the ideals to which each works, and with respect to the code of conduct related to the individual in the pursuit of their leadership or professional role.

There are numerous instances where we have not fulfilled our obligations in the role of a leader or that of a professional. And, I am speaking of the broad area of education and not just singling out technology education, industrial arts or any particular area.

We, so-called professionals, have looked the other way when we saw inferior teaching in our own school settings. We have chosen not to speak out against educational

practices that promote a caste system for the poor and the disadvantaged. We have played deaf and dumb as "teacher proof" programs were being promoted by commercial interests whose motives were the antithesis of what our better judgment would accept. We have, in many instances, chosen to sacrifice the learner in order to perpetuate the system. We have been required to study the principles of human growth and development in our professional preparation, but have proceeded to design our programs and to teach our children as if there was no connection between these elements. And, finally, we have studied the great theories of learning and then acted as if they did not exist when it came time to practice our profession.

A profession must commit to maintain the quality in its own performance. It must be vigilant in its concern for all who come under its purview. It must be outspoken in its rejection of that which is inferior or antithetical in practice. The profession must steady its focus on the stated goal rather than become preoccupied with the maintenance of a system. It must function on the basis of a body of knowledge associated with its purpose and the profession must base its practices on a theoretical framework that constantly probes the extension of effectiveness in the achievement of its goal for the society it serves.

We, in many of our professional organizations, have spent an inordinate amount of time and resources in protecting the incompetent and substandard, and in endorsing programs which fail to deal with the real issues of education in this latter part of the Twentieth Century.

We have inducted into the educational ranks scores of people whose professional responsibility is to assist the young and the old in their fullest development; to achieve the promise in each. Yet these same so-called "professionals" fail to even see that they too must aspire to self-fulfillment and to achieve the promise that is within them. It is that which embodies the spirit of man or woman that frequently makes the difference between leader and follower—between professional and nonprofessional.

It was the spirit of the great Leonardo Da Vinci that in his waning days caused him to seek "God's forgiveness for 'not using all of the resources of his spirit and his art.'"

A few years ago, *The Saturday Review,* in its acclaim to Winston Churchill, contained the following comment. It is a fitting close to this paper:

. . . The atrophy of spirit that most men know and all men fear is tied not so much to deprivation or abuse as it is to their inability to make real the best that lies within them. Defeat begins more with a blur in the vision of what is humanly possible than with the appearance of ogres in the path or the hell beyond the next turning. (P.18)

Finally, if you were to ask me to synthesize the essence of leadership, I would be moved to state: It is that common quality that extends the uncommon nature of the human into the lives and actions of others.

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Dr. Donald Maley, Professor Emeritus of the University of Maryland College Park, was a leading thinker who influenced the course of evolution in our field through his teaching, writing, and extensive speaking schedule.

Curriculum Development-- Who Needs It?

W. Harley Smith

Curriculum documents are viewed by many of our veteran teachers as something that they must keep available on a shelf because it is expected of them. Newer teachers, especially beginning teachers, hold the hope that curriculum documents will be their planning salvation. Historically, many veteran teachers have considered their curriculum documents as too voluminous to be useful, and new teachers have found the guides to be of little help. This is unfortunate because curriculum guides need to be useful and usable documents for both the veteran and beginning teachers.

The usefulness and usability of a curriculum guide are a function of what they contain and how much they contain. If the document has too much in it, teachers will treat it the same way many treat the manual that comes with a computer— it gets used only as a last resort. Likewise, if it's contents don't provide direction for long-range planning, it may not be worth opening.

The information and discussion which follows has three purposes which are revealed in the following questions: 1) "What factors should influence curriculum development in Technology Education?", 2) "What are desirable elements of curriculum documentation?", and 3) "By what process should curriculum development take place?." The answers to these questions should lead us to produce curriculum documents which are both useful and usable.

What factors should influence curriculum development in Technology Education? Seven factors are identified and described below.

1. Philosophy of Education

This represents the value system of the community, school system, school and teacher concerning the mission and purpose of education. In modern America, some key perspectives on a philosophy of education need to address: 1) the role of education in each student's development, 2) the role of education in continuing and advancing our culture, 3) the role and responsibilities of the school staff, 4) the role and responsibilities of parents, and 5) the role and responsibilities of the students. Philosophy of education influences what we teach, our expectations for each of the stakeholders, and the environment in which teaching and learning take place.

2. Human Growth and Development

This represents what is known about the age, characteristics and needs of students at various stages of development. Human growth and development enlightens us concerning the student's physiological, psychological, intellectual and sociological maturation. It influences how we approach teaching and learning, and our expectations for achievement.

3. Learning Theory and Brain Research

This represents what is known about how learning takes place and the ways in which learning varies among individuals. These disciplines have given us new understanding about multiple intelligences, learning styles, and thinking processes. It influences how we approach teaching and learning, student assessment, and the environment in which teaching and learning take place.

4. Career Trends, Opportunities and Requirements

This represents what is known about the current and future nature of work, current and future expectations of employers for employees and the skill and abilities needed by people to be viable and contributing members of the workforce. It influences what we teach and the kinds of experiences we provide to students.

5. Definition and Mission of Technology Education

This represents what the leading thinkers in Technology Education have envisioned as the role of this curricular field in consideration of the previously identified factors influencing curriculum development. It influences what is taught and learned, how we approach teaching and learning, and the environment in which teaching and learning take place.

6. Trends and Standards for Technology Education

The standards represent state and/or national consensus on the current characteristics of high-quality Technology Education. These trends represent the direction of program evolution for the future. Just as the Technology Education definition and mission should be governed by the first four influential factors in curriculum development, so should program trends and standards. Trends and standards influence program instructional content, teaching/learning strategies, facilities and other instructional support environments, and student assessment.

7. School System Instructional Priorities

This represents the teaching/learning priorities of the local and/or state educational system. For the most part, these will be consistent with the first four influential factors in curriculum development. School system special instructional priorities will usually be influenced by known deficiencies in student achievement or performance. Technology Education professionals in a school district should strive to engage in and support the achievement of

these special priorities by accounting for them in curriculum documents and classroom instruction.

Educators need curriculum documents to be both useful and usable.

What are desirable elements of curriculum documentation? The organization and content of curriculum documents may be influenced by formats established by local school systems. However, the inclusion of the elements identified in the discussion which follows have proven to contribute to making a curriculum document useful and usable.

1. *Background Information*

This element may be a major section of a curriculum document which appears first to provide a synopsis or summary of the factors, such as mentioned above, which have influenced the curriculum development.

2. *Teaching/Learning Strategies*

This element may be a major section of a curriculum document which informs the teacher, with sufficient detail to guide planning, how the teacher may orchestrate various processes and experiences through which students will learn. This information may be presented effectively using flow charts supported by succinct, descriptive information about the various phases of the teaching/learning strategy represented in the flow chart. Six teaching/learning strategies appropriate for Technology Education are presented in this fashion in the Donald Maley Monograph Series, Volume 2, titled, "Teaching/Learning Strategies for Technology Education" (Technology Education Association of Maryland, 1998).

Each course which is included in a curriculum document should have its own course guide section. A curriculum document may contain a single course guide section for only one course, or several course guide sections (one for each of several courses) in the same document. The following elements are suggested for inclusion in the course guide section for each course.

3. *Course Description(s)*

This section describes what students will learn and experience in a course, but without detail. It also identifies the benefits of the course for the students. The course description should be written in a succinct paragraph in terms appropriate for students and lay people.

4. *Instructional Scope*

This element may be divided into two sections. Both of them will identify what students will be expected to know, do and value after completing the course. Thus, they account for the three elements of Bloom's Taxonomy (cognitive, psychomotor and affective). The two sections (Planning Statements and Topical Outline) are further described below.

Planning Statements— These are the statements that, in the past, have been called outcomes, goals and objectives. Terms currently in vogue in Maryland and which correspond to the traditional terms are: domain, expectancy and indicator. Domains (outcomes) identify the major areas or categories in which students will achieve in the course (i.e. Problem-Solving Using Technology). Expectancy (goal) statements are broad statements— even vague— which identify the expected student behavior related to a domain (i.e. demonstrate ability to solve problems using technology). Indicator (objective) statements are more specific descriptions of the student behaviors which would verify student achievement of an expectancy. Some indicator statements which would follow the example domain and example expectancy statements given are :

- The student will "brainstorm" to identify alternatives in solving problems with technology.
- The student will select a practical technological approach to solving a problem.
- The student will construct prototypes of technology systems to solve problems.
- The student will test technology systems for effectiveness in solving problems.
- The student will use "feedback" to refine technology systems.

A reference for the domains, expectancies and sample indicator statements for Technology Education in Maryland is the document, "Technology Education: A Maryland Curricular Framework" (The Maryland State Department of Education, 1994).

Topical Outline— This details the content of the course in an outline form. It should have sufficient detail to enable the teacher to plan instruction relating to each of the course domains.

5. *Instructional Sequence*

This element is important to the teacher for planning the order of teaching and learning. It identifies the sequence and approximate time allocations for various topics, units and instructional activities. A calendar format works well for representing instructional sequence. However, it should never be intended that a calendar hold a teacher to a rigid schedule for the course. Such use would require the teacher to be at a specified point in the sequence on a given day. Rather, the calendar for a semester-long or year-long course may lay out a plan on a weekly basis as a pacer for the teacher. As a pacer, it would inform the teacher if he or she may extend or should shorten instructional activities later in the course. It is essential that teachers have some authority to adjust the time devoted to various instructional topics and experiences in order to account for differences in student and class achievement, and other factors beyond

the teacher's control (i.e. snow days, assemblies, reteaching, etc.).

It is essential that teachers have some authority to adjust the time devoted to various instructional topics and experiences.

6. Student Assessment

This element provides guidance to the teacher concerning how student achievement should be evaluated. Some guiding principles that this element of the curriculum document should provide to teachers are described as follows.

- The student's performance of processes in lab activities should be evaluated, rather than evaluating the tangible results of the processes. This is not to suggest that an examination of the results of the lab processes is not revealing of the student's performance of the processes. Keep in mind that we are evaluating student performance, not just the appearance and performance of their products.
- The weight that various grading factors receive should be proportional to the amount of time students are expected to devote to them. If students spend one of 36 hours in a quarterly written examination, the exam should not count for 25 percent of the grade.
- Lab time is rich with opportunities to observe student performance of the greater portion of Technology Education achievement indicators (objectives). To document such observation, simple checklists may be useful to the teacher.
- It's all right to have students participate in their own evaluation. Checklists may be a good tool for this.
- There needs to be an alignment of that which is evaluated with what is declared to be the indicators of student achievement. That is why we have indicator (objective) statements.

7. Instructional Resources and Materials

This element identifies for the teacher the resources and materials which have been found supportive of the teaching and learning expected in the course. Such things as video materials, computer software, internet sites, books, posters, transparencies, etc. may be conveniently identified in a special column in the Topical Outline for the course. The hazard of including this information in a curriculum document is that it will constantly need updating as new items enter the market and are discovered. Perhaps this is a section that should be a supplement to the curriculum document, and the curriculum document should direct the teacher to seek the most recent Instructional Resources and Materials Supplement.

The exclusion of instructional activities from this discussion of desirable elements of curriculum documentation is a matter of preference. Many educators like the idea of including instructional activities in a curriculum guide. However, there is one reason not to include the activities.

Including activities in a curriculum document means that any variation or change in the activities by the teacher as a result of teacher creativity, available resources and student interest will necessitate a revision of the curriculum document. Each teacher may need to have his or her own custom-tailored curriculum guide if flexibility is to be maintained, enabling the teacher to be creative and adaptive to the circumstances of the class. To accommodate this kind of desirable flexibility for teachers in selecting instructional activities, it would seem better to document activities in resource materials rather than in curricular guides. Resource materials are more easily created, revised and expanded than are curriculum guides which require Board of Education approval.

By what process should curriculum development take place? The process that is presented here is the ideal. In many circumstances, it may not be entirely practical. Deviation to accommodate the circumstances of the writing effort should be exercised in good judgement .

1. Select a Team of Curriculum Developers

People knowledgable about the subject matter, experienced in teaching the course(s), skilled at writing, and computer capable are desirable writers. But, it also is good to have some less knowledgeable participants who can contribute something, but who may benefit more from the experience as a staff development opportunity. They will be better teachers for having been part of the writing effort.

2. Make Sure that the Writers are Prepared Determine or take steps to assure that the developers are grounded in the factors which should influence curriculum development in technology education.

3. Define or Adopt Standards to be Met by the Curricula(um) In our field, we have State of Maryland standards (Quality Indicators for Technology Education Programs in Maryland) and will soon have national standards which can be adopted.

4. Define or Adopt a Curricular Structure If the curricular document addresses a multi-course or multi-offering program, a curricular structure will identify the array of

courses and a sequence for the courses where appropriate.

5. Outline the Instructional Scope This should be a literal outline with enough detail that the teachers who will use the document for lesson planning can recognize the content for their lesson.

6. Define or Adopt Teaching/Learning Strategies The Technology Education Association of Maryland has documented six appropriate teaching/learning strategies in its 1998 publication of The Donald Maley Monograph Series, Volume 2 (Teaching/Learning Strategies for Technology Education).

7. Develop a Plan of Instructional Activities This will represent the sequence of instructional activities including both teacher-directed activities (lessons and demonstrations) and student independent practice and lab activities. As mentioned before, the student activities should be flexibly defined to allow for teacher creativity and choice.

8. Write Instructional Indicators (Objectives) There should be performance indicators/objectives based on what is developed in steps 5, 6 and 7 in this process. The indicator/objective statements should address student knowledge (cognitive domain), skills (psychomotor domain) and value development (affective domain).

9. Write the Course Description This is done at a late stage, after the course nature has been fashioned in earlier steps.

10. Conduct a Professional Review of the Document Let teachers, administrators, representatives from higher education and members of the business/industry community provide feedback.

11. Field Test the Curriculum Have teachers plan and conduct their instruction following the curriculum guide to assess its usability and usefulness.

12. Make Revisions Based on Field-Test and Professional Review Feedback Curriculum development and documentation requires significant preparation, time and effort. Making curriculum guides useful and usable for teachers necessitates consideration of the important factors which should influence the technology education curriculum, inclusion of valuable elements in the document structure and format, and a practical process for document writing which assures that the curriculum is viable for students and manageable for teachers.

W. Harley Smith recently retired as Supervisor of Technology Education in Prince George's County, Maryland.

Maryland Teachers' Opinions on Modules

Jon Aull

I began using modules in the fall of 1994. I soon began to wonder to what degree the modules in my classroom were meeting the educational objectives of Technology Education in Maryland. Potential problems with modules included a lack of clearly defined objectives, questionable tests, difficulty in keeping modules in good repair, long wait times for students with questions, and problems and directions that are vague or unclear. I wondered if these challenges were similar to those of other Technology Education teachers.

Technology Education teachers throughout Maryland are using modules to provide instruction, even though little formal research has been done to determine their educational value and effectiveness. A significant research base was and continues to be lacking.

I believe it is important that educators ensure the curriculum and delivery methods they use produce the maximum educational value and benefit for students. This research was designed to determine how effectively the modules used in Maryland high school Technology Education programs were meeting the identified State outcomes.

I searched the *Dissertation Abstracts International, Current Index to Journals in Education, Applied Science and Technology Index, and the Educational Resource Information Center*. Most of the information on technology education modules resembled advertisements rather than research (Petrina, 1993, p. 76). I then contacted several vendors who claimed to have done extensive research in the classroom before introducing modules to the profession. This research was market based, and no "official research on the effectiveness of each module" had been conducted (A. Peters, personal communication, December 6, 1994; R. Whittfield, personal communication, December 9, 1994).

In addition, there were several editorial style articles; these were split -- some in support of modules and others in opposition (Daugherty and Foster, 1996; Adamson and Gloeckner, 1996; Pullias, 1997; Wright, 1997). Technology educators were contacted by email. Their responses of were diverse. Some were satisfied with the modular approach, and others were disappointed (Roth, 1997; Lind, 1997).

While the opinions of educators as expressed in articles and through conversations can be useful, the pervasiveness of modular technology education and the lack of formal research on the topic point out a potentially serious problem. Technology Education professionals have a responsibility to provide effective instruction to their students. There has been little formal research on the topic of modular technology education to determine its effectiveness. It is imperative that Technology Education professionals conduct the research necessary to determine the educational benefits of modules and determine their effectiveness at meeting the outcomes for Technology Education. "Research is the means by which a field of study builds a knowledge base and validates the theories that support the field. It is an activity that is vital to the growth and development of any discipline" (Foster, 1992, p. 50).

The review of literature makes it clear that the use of modular instruction has been going on since the technologies necessary for its implementation have been available. The use of teaching machines since the 1930s, programmed instruction, and then the computer in classrooms have all been attempts to improve education by allowing students to work individually at a programmed learning station. They all were designed to allow students to work at their own pace, with immediate feedback (Hlebowitsh, 1988, p. 54).

For many educators these attempts were met with unbridled enthusiasm and a rush to purchase the "latest and greatest" technology first. The desire to be on the "cutting edge" was strong. Eventually, the questions started to be asked, the research was done, and the extravagant claims of the proponents of these new technologies were not proven correct (Hlebowitsh, 1988, p. 53). The mistakes of the past were repeated over and over again. Purchases were made, based not on sound educational principles, but rather because the technology looked "neat," and promised to do so much. Teachers, administrators, and boards of education did not ask the right questions. Is it designed and written by qualified educators? Has it been tested and redesigned? Has proper educational research been conducted that indicates its effectiveness? Instead, price, cost-savings, and clever advertising were the driving forces.

Today the producers of modules for technology education are making some remarkable claims about their products. Many of these claims are similar to those made by proponents of the teaching machine. Modules are easy to use, inexpensive, and will teach problem solving. The students will be motivated to learn (Applied, March 96, p. 16; Lego, March 96, p. 10 insert; Hearlihy, November 1994, p. 28). These claims sound almost too good to be true.

Are they?

No one really knows how well the modules on the market today are teaching what the manufacturers claim. There has been little research. In fact, this researcher was not able to find any research regarding the effectiveness of modules at meeting the goals of Technology Education. The manufacturers of these products have published few findings, and the Technology Education profession has not taken it upon itself to evaluate these products.

My research was among the first conducted on the use of modular Technology Education in Maryland high schools. The instrument used in the study was designed with the assistance of the faculty of Millersville University's Department of Industry and Technology in the spring of 1996. The instrument was validated with the assistance of the participants in a technology education workshop at Cambridge-South Dorchester High School on June 24, 1996. These participants read and responded to the survey and were then asked several questions. Their responses were used to make corrections to the instrument.

The sample population was chosen, and the surveys were mailed to each Maryland public high school Technology Education Department chairperson in the spring of 1997. Non-respondents received a second letter and phone call. A total of 94 out of 176 individuals responded to the survey. Fifty-eight of the 94 respondents were not using modules in their classroom and were instructed to stop after the second question. Only 36 of the 94 respondents were using modules in their classrooms and answered all (one respondent failed to answer one question) of the survey questions.

Currently less than 50% of the schools in Maryland are using modules in their Technology Education programs. On average, each of these schools possess fourteen modules.

A significant percentage (16.6%) of the Technology Education teachers in Maryland who are currently using modules would like to discontinue their use. Nearly half (47.9%) of the teachers surveyed wish to use modules, and slightly more than half (52.1%) do not wish to use modules. This echoes the divergence of opinion in the review of literature.

Furthermore, a majority of teachers who use modules in Maryland believe that Technology Education modules are effective at meeting a great majority of the stated outcomes for Maryland Technology Education. Respondents do not believe they meet them all, nor do they believe modules cover any of the goals fully. Respondents indicated that when used properly, modules can contribute to a well-rounded Technology Education program, but they do not indicate that modules are necessary to a well-rounded Technology Education program.

The respondents identified several positive contributions of modules. They allow students to be exposed to a large number of technologies in a short period of time. Furthermore, modules allow for integration with other subject areas and improve public perceptions about their programs. Finally, modules can help Industrial Arts teachers make the transition to Technology Education.

The respondents also identified several limitations of modules. They may not be the most effective method of delivering instruction relative to moral and ethical decisions regarding technology. Modules also allow for increased class size and can create a situation where the teacher is pulled in too many directions. Additionally, modules are difficult to repair and maintain, and many students experience significant downtime due to module malfunctions.

The respondents also indicate that most modules will not meet the teacher's needs as they are shipped, some modification is necessary in most cases, and in a few cases the module will require major changes to be of benefit to the students. These changes take time and add to the overall cost of the module.

This research indicates a need for professionals and administrators to be cautious before choosing modules as the delivery method for technology education. They should give serious consideration to whether modules are the most appropriate delivery method for their school's curriculum and facilities. If the decision is made to purchase modules, attention must be paid to which modules are selected. It is easy to fall into the "neat activity trap," selecting modules because the technology looks interesting. Laboratory planners must research specific modules **before** any decisions are made regarding which modules will be utilized.

I hope that some of you reading this article will add to the findings of this research study. The following recommendations are based on this current study and the previously stated conclusions.

1. Studies should be conducted on the effectiveness of individual modules using an objective criterion-based approach, not teacher opinion.
2. A study should be conducted to determine how teachers are supplementing the use of modules in their classrooms.
3. A study should be conducted to determine what specific types of changes teachers are making to the modules used in their classrooms.

4. A study should be conducted to determine how much of a role the change from Industrial Arts to Technology Education has had on teacher selection of modular Technology Education.
5. A study should be conducted to determine the effectiveness of teacher constructed modules.
6. A study should be conducted to determine why teachers are not using or are eliminating modules in their classroom.

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Technology Education Association of Maryland Presidents

YEAR	NAME	SCHOOL SYSTEM
1966-67	Amien Joseph	Baltimore County
1970-71	Alan Brown	Montgomery County
1972-73	Bob Norris	Prince George's County
1974-75	Bob Norris	Prince George's County
1976-77	Charles Beatty	UMCP
1978-79	Robert Sharp	Anne Arundel County
1980-81	Charles Beatty	UMCP
1982-83	Roland Phelps	Baltimore County
1984-85	Dennis Siebert	Howard County
1986-87	Milt McGrew	Frederick County
1988-89	Barry Burke, DTE	Montgomery County
1990-91	Robert Gray, DTE	Prince George's County
1992-93	John Antonishak	Montgomery County
1994	Brigitte Valesey, DTE	Montgomery County
1995	Chris Scholz	Howard County
1996	Wendel Matthews	Prince George's County
1997	David Buddenbohn	St. Mary's County
1998	David Buddenbohn	St. Mary's County
1999	Tom Milans	Montgomery County
2000	Adam Sheinhorn	Howard County

Student Competitions:
Maximize the Technology Education Experience While Building Community Support

Joe Baker

Strange things happen when you have engineering competitions for students at any of the grade levels. Spectators become amazed and want to know how they can help the schools. Judges become more involved and want to do more for the schools. Students become involved with learning and don't realize it. Where can you find better individuals to promote your program? You have the students talking about what they received at the competition or what they won. They are talking about how much fun they had. The team sponsors look at the students in a different light. The parents get excited that their child is involved. The judges go back to their workplaces with stories about how the students overcame problems in the competition.

Public relations is a critical to keeping Technology Education alive and in the classrooms. Think about the core subject areas. Every student is exposed to them and will continue to be exposed to them. What other content areas are the students exposed to? Art, music, band, chorus, physical education, information technology, and maybe foreign language. Do you see technology education? When these students reach the middle school, will they choose technology education? If it is not mandatory for them to enroll in technology education the answer is probably NO. They and a lot of the general population do not know what technology education is. How do you change this?

- Contact an elementary school that feeds your school and help a teacher teach a technology challenge or a small technology unit.
- Have the elementary students come to your school to perform work on their technology unit. Use your students as mentors and teachers with elementary students.
- Take a field trip with your students to an elementary school and teach a technology activity.
- Get together with several educators and create an elementary competition at the school level that combines core subject areas with technology education. You know about MSPAP.
- Form a consortium with other technology teachers in your school system or with technology teachers from other school systems and put together a competition for middle and high school students. Talk to several businesses that could relate to the competition that you design and get them to sponsor prizes. (Remember everyone is asking businesses for donations but you ask them to sponsor and judge the competition.)
- Invite news media people to cover the event and do a story. Get someone to videotape the event to make a demo video to enhance your sales pitch to prospective sponsors.
- Invite the top administrators in your county along with the school board to the competition.
- Try to get to the Chamber of Commerce or other similar groups and give your sales pitch. Invite them to the competition.

The competitions you design should be easily integrated in the classroom. Activities for the competitions should meet existing goals, indicators and benchmarks. With more students involved in the activity, the more students will understand what technology education is and the more their parents will become aware. The bottom line is that we need to expose students to technology education at an early age if they are going to pick technology education as an elective. In the elementary schools that have used a technology activity, the students ask if they are going to do another technology activity this year. They are interested and they are ready!

Since 1994, the Southern Maryland Consortium of Science, Mathematics, and Technology Education has distributed over $75,000 in prizes to students participating in competitions.

Joe Baker is the Resource Teacher for Career and Technology Education in St. Mary's County, Maryland.

The Technology Educator's Bookshelf

There is a wealth of current books that technology teachers might find useful and interesting. Among them are several that have been reviewed in TEAM publications in the last year. They include:

Guns, Germs, and Steel: The Fates of Human Societies by Jared Diamond, Norton, 1997.

Invention By Design by Henry Petrosky, Harvard University Press, 1996

TEAM's newsletters and journal have for the past year featured reviews of some of the best of these new books. Doctors Angelo and Lynne Gilli have graciously shared with us book reviews they have done for other publications.

We are proud to present another of their reviews in this edition of the Maryland Technology Teacher.

A History of Modern Computers
Paul E. Ceruzzi
Cambridge, MA.: MIT, 398 pp, 1998, $35.00

Prior to 1945, the word 'computer' was defined as a person who solved equations. Since that time, its meaning has been broadened to embrace machinery. With the evolution and popularization of the computer, it became known as a machine for calculation. Although still used for that purpose in contemporary times, its most universal use was for the purpose of providing networked information. The author skillfully described this transition through the past half century.

The major themes developed in the work are well previewed in the introductory chapter. An important thread persisted through the many changes seen in computer technology. In spite of the transition from vacuum tubes to integrated circuits, the manner in which information was made to flow within a computer remained unchanged. This was in spite of computing passing through three major 'generations': from use of vacuum tubes, to transistors, and then to integrated circuits. An explanation of these developments was provided in later chapters. The role of the military in the advancement of solid state electronics was both positive and negative since much of it was driven by Cold War concerns. However, it did provide important impetus to the evolution.

The role of IBM came out frequently in this history, especially for its influence on the computer industry from 1952 through to the 1980s. Another major theme in this book that contributed to the progression of computer technology was the development of software. Throughout the 1990s, software came to dominate. In reviewing movements in the software industry, the author reviewed the nature of the two camps that emerged. The first dealt with companies that made fortunes in selling software and their related operating systems. Microsoft was the most notable one mentioned. But these developments, claimed Ceruzzi, evolved to a great extent from the prior development of programming languages. Chief among these were FORTRAN, BASIC, COBOL, and a large number of obscure languages. He pointed to the strong connections between the two camps.

The last theme developed here was an examination of the place of information in a society such as ours. In some ways, by freely distributing information, computer users share many values associated with operators of printing presses. These freedoms have been claimed to be guaranteed by the First Amendment. But, on the other hand, computers have also been agents of control. Ceruzzi raised the question: "Are the two attributes at odds with each other?" The query was left unanswered of course.

This nine chapter work nicely covered the history of computers from 1945 through the 1990s in the United States. Developments in other parts of the world were not treated here. Apparently the author felt that to restrict his investigation to the United States was a sufficiently large task. In retrospect, although some issues may have been omitted by making that choice, it seems reasonable to assume that Caruzzi provided a thorough review of the topic.

The last statement made by the author in his Conclusion revealed some interesting concerns regarding the place of the computer in the future. Ceruzzi stated: 'We created the computer to serve us... As we start to accept the World Wide Web as a natural part of our daily existence, perhaps it is time to revisit the question of control. My hope is that, with an understanding of history and a dash of Thoreauvian skepticism, we can learn to use the computer rather than allowing it to use us.' Time will indicate the answer.

Thorough documentation was employed throughout, as evidenced by the inclusion of 53 pages of notes, clearly

itemized on a chapter by chapter basis. This was followed by a generous Bibliography which provided a total of 256 titles. Both the notes and Bibliography would be invaluable sources for readers interested in delving further into various aspects of this subject. For those seeking specific information, a highly usable index was provided. Unlike most books, the reader can turn to any chapter without losing the meaning of its contents even if they had not read the prior chapter. It is a timely subject and a good read.

Lynne M. Gilli
Angelo C. Gilli, Sr.

Editor's Note:

The following review comes from Fred Nastvolgel, Technology Education teacher at Howard High School, Howard County, Maryland. "The elevator, a cramped little box and a system of pulleys, counterweights and brakes and those people who inspect them are the subjects of this novel." Gary Christ of the New York Times described this book's author as not being "in full control of the many thematic elements . . ., unleashed in the dense and sometimes difficult book" but "Literary reputations may not always rise and fall as predictably as elevators, but if there is any justice in the words of fiction" this work "should be heading toward the upper floors."

The Intuitionist
By Colson Whitehead
Anchor Books/Doubleday, New York, 1999, 255 pp, $19.95

> This one is for *us*.
> ...We who ask HOW, not *why*.
> ...the ones who want to know APPLICATION, not *purpose*.
> It's a book, a mystery of sorts.
> *Sans* murder!

Except, of course, for the elevator: an elevator gets offed. Well, it doesn't really get *offed*. It gets downed, Elevators fall *down*.

And they go UP! It's magic. They lift people. They take people of the world to new heights. The elevator is the key to the modern city, and it is the quintessential symbol of ascendancy.

Can there be a perfect elevator? Can there be a human contrivance *so* perfect that it is nothing less than the glide of fulfillment?

"Yes!" That's the proposition that the book's mysterious (and deceased!) Mr. Fulton has developed in his soon to be famous *Second Volume*. It is his work on the Black Box, and the world awaits it, particularly that peculiar population pack who are the elevator inspectors.

These are an odd lot, elevator inspectors. The olde guarde are the Empiricists. They check out each bearing. Each foot of cable. They take the plates off switch boxes and probe around inside.

The new school are the Intuitionists. Inspired by Mr. Fulton himself, they inspect elevators by knowing them, each individually, in a gesture of cosmic intimacy with the mechanical truth.

". . .The diary shows he was working on an elevator, and that he was constructing it in Intuitionist principles. From what we can tell from his notes, he finished it. There's a blueprint out there somewhere."

> Lila Mae tries to get her head around that last bit. At least Mr. Reed is taking it slowly, trying to walk her through it. But still. "I don't see how that is possible," Lila Mae murmurs, twisting the button of her suit. "I mean from an engineering standpoint. At its core, Intuitionism is about communicating with the elevator on a nonmaterial basis. "Separate the elevator from the elevatorness," right? Seems hard to build something of out of steel."
>
> Mr. Reed withdraws a cigarette from a silver case. "They're not as incompatible as you might think," he says. "That's what Volume One hinted at and Volume Two tried to express in its ellipses- a regeneration of our relationship to objects..."[page 62]

This is rich. And it is relevant. It parallels, with stunning seriousness, the ongoing oppositions of I.A. and Enlightened Technological Generalism.

Yet it is not *dead* serious. It's funny, in fact. Relentlessly tongue-in-cheek, it is a marvelously mocking mirror of the micro-minded, as we Tech Ed types might be ourselves.

Add to this slurs upon mindless bureaucracy, reflections on diversity, some passages on organized crime, and what must be the world's wittiest twist on *deus ex machina*, and we've got a must-read.

Take a copy to your next faculty meeting.

Note: If you have read something that you think is worthy of review in this journal, please forward that information to the editor..

A New Wrinkle in the "Golf Ball Float" Ingenuity Challenge

Aaron M. Gray

Maryland's emphasis on raising the achievement levels of students in mathematics is cause to reexamine the way we are teaching students about technology. By making some minor additions to a long-established Ingenuity Challenge, students are required to demonstrate knowledge and skills identified in our State's Core Learning Goals.

The Ingenuity Challenge teaching/learning strategy provides a way for students to: 1) learn and practice systematic problem solving; 2) develop and apply their ingenuity and creativity; and 3) make concrete applications of concepts and skills learned in mathematics, science, and language arts.

The *Golf Ball Float* is a short-term Ingenuity Challenge in which students design and fabricate an aluminum boat (vessel) that will hold as many golf balls as possible before sinking. The specifications for the challenge include the statement of the problem, rules for the challenge, the resources available, and how solutions will be evaluated.

The new element being suggested here is to have students collect and analyze data that will guide them in their design process. By making predictions about a design's effectiveness and then constructing and testing a series of sample designs, students learn the relationship between a vessel's volume and its ability to support a load.

In the process of obtaining valuable data; students develop measuring skills, fabrication skills, and skill in loading the vessels. They also develop an understanding of the science concepts related to the activity including: force, gravity, buoyancy, displacement, density, balance, center of gravity, mass, and volume. In the process of making predictions about a vessel's capacity, they are required to perform several mathematical calculations.

Armed with the results from this preliminary activity, students are ready to tackle the *Golf Ball Challenge*.

Ingenuity Challenge: Problem Assignment Specifications For "Golf Ball Float"

Challenge Problem:

Design and fabricate an aluminum boat which will hold as many golf balls as possible before sinking.

Rules:

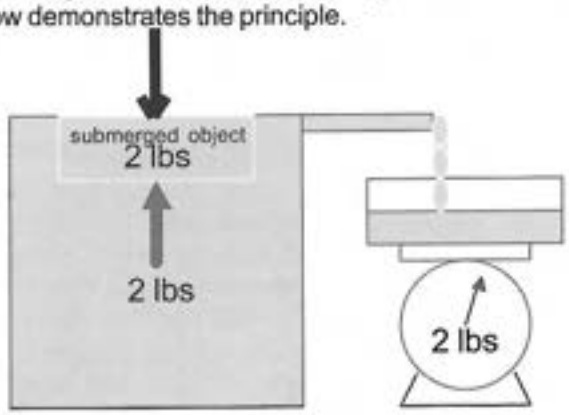
1. ***Each student is to fabricate an aluminum boat from a twelve-inch square piece of aluminum foil.***
2. ***Each student will build and test his/her own boat.***

Resources:

People:	***Students working individually***
Information:	***Facts and knowledge the individual possesses or obtains.***
	Instruction from teacher
Materials:	***Aluminum foil, 30 cm x 30 cm (12" x 12")***
Tools:	***Ruler***
Time:	***90 Minutes***
Energy:	***Human muscle power***
Capital:	***Provided by teacher***

Evaluation: ***The boat that floats while holding the greatest number of golf balls will be the winner***

In the *Ingenuity Challenge* Teaching Learning Strategy, the teacher provides instruction on science, mathematics, and technology concepts related to the problem. For this challenge, students are introduced to Archimedes' Principle which states that the buoyancy of a submerged or partially submerged object is equal to the weight of the fluid the object displaces. The setup below demonstrates the principle.



For the floating object, the gravitational force must be equal to the buoyant force, otherwise , the object would rise or sink due to the net force. For example, a 10 pound log is floating in a bucket of water that is filled to the very top. If we caught all of the water that spilled out when the log was placed into the water and then weighed it, we would find that the displaced water weighed exactly 10 pounds. According to Archimedes, this 10 pounds is equal to the buoyant force. Since the log is floating, we know the buoyant force must be 10 pounds.

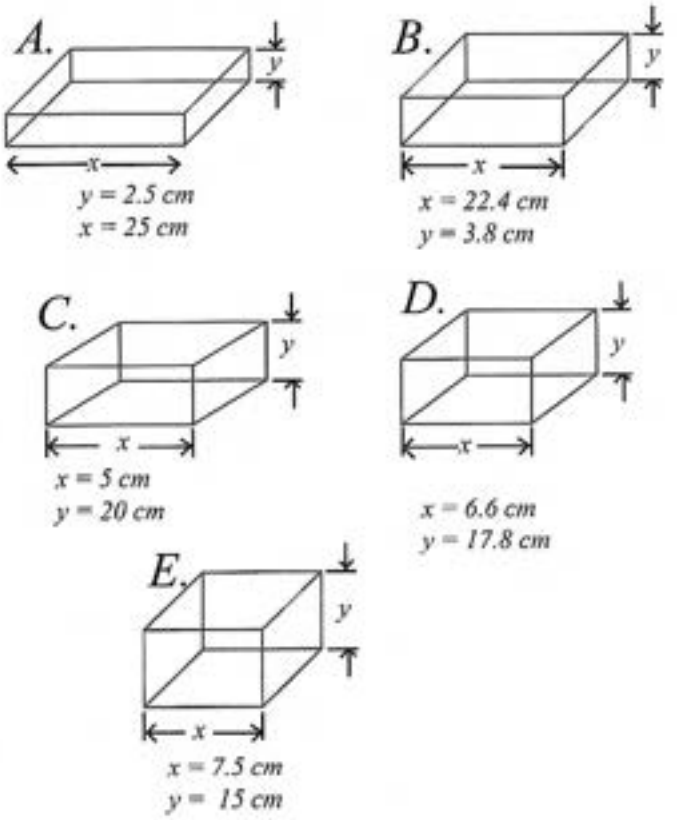
To float a cargo we need to create a vessel that has good stability, strength, and capacity. Stability will keep the vessel from tipping over. Strength will keep it from breaking or changing shape. Capacity will determine how much cargo it can support.

There must be enough room on board the vessel to store the cargo. The vessel must also be shaped in a way to displace as much water as possible resulting in as much buoyant force as possible. The more water displaced the better.

With this information and some instruction on shaping the material, students begin the problem solving process. They may "design-on-the-fly," creating a vessel by shaping the material into a boat that they think will hold a number of golf balls. Before preliminary testing, it is desirable to have the students record their prediction of the number of balls their vessel will hold.

After preliminary testing students will have recorded their predicted and actual results and will have acquired considerable knowledge regarding subtle aspects of the problem such as the importance of carefully loading the vessel to avoid sinking the vessel before its maximum capacity is reached.

At this point some more formal data collection is needed before more designing. Assign teams of two students to construct the following shaped vessels.



Before testing, students will calculate the volume of their vessel and determine the buoyant force created by submerging the vessel. The following table will guide students through the process.

	Vessel Size(cm)	*Volume (cu cm)*	*Predicted Capacity*	*Actual Capacity**
Vessel		* Calculations to be done by students		
A.	*25 x 25 x 2.5*	*1563**	*31**	____
B.	*22.4 x 22.4 x 3.8*	*1907**	*40**	____
C.	*20 x 20 x 5*	*2000**	*40**	____
D.	*18 x 18 x 6.4*	*2074**	*41**	____
E.	*7.6 x 7.6 x 15*	*1710**	*34**	____

It may be useful to use the following teaching aid to help students calculate the volume of the vessels.

Finding Volume of a Rectangular Object

$V = l \times w \times h$

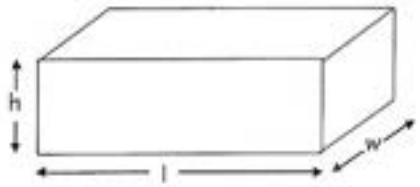
where

V = volume

l = length

w = width

h = height



For example, what is the volume of a 18 cm x 8 cm x 5 cm rectangular solid.

$V = l \times w \times h$

$V = 18\ cm \times 8\ cm \times 5\ cm$

$V = 720\ cu.\ cm.$

Once students know the volume of the vessel, they will calculate the buoyant force developed when it is submerged. At this point we utilize Archimedes' Principal to make a prediction of the capacity of the vessel. The buoyant force is equal to the weight of the fluid displaced. One cubic centimeter of water weighs one gram so the buoyant force is equals:

Buoyant Force = $V(cm^3)$ x Weight of Water (g/cm^3)

For the example above, the buoyant force is:

$$720\ cm^3 \times 1\ g/cm = 720\ g$$

The capacity of the vessel is determined by dividing the weight of a golf ball into the vessel's capacity.

$$\frac{720\ g}{46\ g/\ golf\ ball} = 15.6\ golf\ balls$$

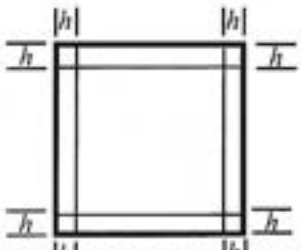
The predicted capacity of the vessel is 15 golf balls. Students will use this process to calculate the capacity of the test vessels and fill in the third column of the table.

The next step is to test the vessels' capacity by loading it until it sinks. They will record the number of golf balls held in the last column of the table. If the predicted results do not match the actual results, a good follow-up activity is for the students to speculate on why their prediction was not accurate.

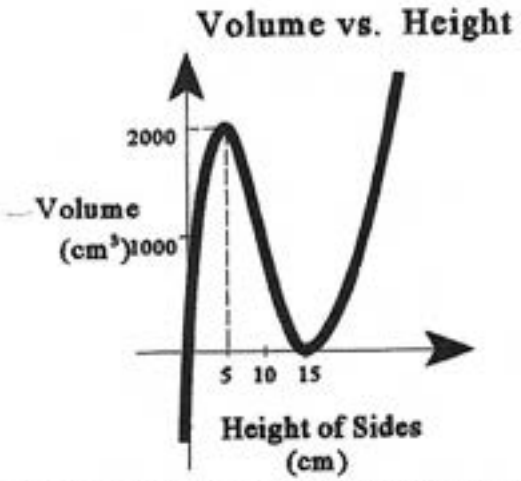
Another interesting mathematics application related to this problem is to have the students calculate the maximum volume that can be attained from the material. Determining the maximum volume box that can be made from a sheet of material can be determined using the following formula:

V = h(length - 2h) (width - 2h)

"V" is the volume and "h"is the height of the resulting box.



The graph below indicates a definite value for "h" that will provide the maximum volume.



With this experience, students are prepared to tackle the challenge again using their own designs. They may decide to use shapes other than rectangular solids but their knowledge and skills base has been enhanced to a point where they can make a very efficient vessel.

Aaron M. Gray is the Technology Education teacher at Burleigh Manor Middle School in Howard County, Maryland. For more information contact Aaron at amgray@umd5.umd.edu.

Maryland's 1998-99 Award Winners

Each year the Technology Education Association of Maryland (TEAM) recognizes Maryland's outstanding Technology Education teachers and programs. The awards are given to educators at the elementary, middle, high school and post-secondary levels. Many of Maryland's award recipients will also be honored at the International Technology Education Association's annual conference to be held in Salt Lake City in April.

St. Mary's County Award Winners

(L-R) Richard Adams, Drew Evans, Drew Dowdell, Barbara Musser, Joseph Hultman, Dr. Patricia Richardson (Superintendent of Schools), Kim Weaver, and David Buddenbohn

Award	Award Winner	School	County
High School Teacher Excellence	Gary Boats	Overlea High School	Baltimore
Middle School Teacher Excellence	Larry Pekofsky	Elkridge Landing Middle	Howard
Elem. School Teacher Excellence	Teresa Sadeghin	Samuel Ogle Elementary	Prince George's
High School Program Excellence	Quinn Patterson Leon Knight	Gwynn Park High School	Prince George's
Middle School Program Excellence	Dan Wood	Ellicott Mills Mid. School	Howard
Elem. School Program Excellence	Gerald P. Bush, III	Clearspring Elem.School	Montgomery
New Technology Education Teacher	Marc Rosenberg	Liberty High School	Carroll
Leadership Award	Barry Burke, DTE		Montgomery
Lifetime Achievement Award	Harley Smith		Prince George's
Advocacy Award	Wade Kingsley	Arby's Restaurants- Southern Maryland	
Advocacy Award	William Gluck	Engineering Society of Baltimore	

Distinguished Technology Educator Awards for 1998-1999

Dennis Hearn
Kenneth Bradshaw
Roy Rosnik
Scott Beattie
Barbara Musser
Drew Dowdell
Howard Spears
Lynn Hillestad
Michael Dodd-O
Jason Daigle
James Groves
Joseph Hultman
James Forest
Andre Weichbrod
Paul Wiedorn
Christopher Gray
Don Gable
Drew Evans
Richard Adams
Brian Niekamp

Certificate of Excellence Awards for 1998-1999

Dale Antosh
Adam Frederick
Lloyd Sedillo
Michael Callaway
Darrell Rapp
Kim Weaver
Joseph Scholz
Kevin Hardy
Kim Vigliotta
Lisa Feidler
Rick Avondet
Lori Fritzsche
David Buddenbohn
Marquita Friday
Niel Leon
Adam Sheinhorn
Thomas Milans
Larry Pekofsky
Pat Vogel
Leon Copeland, Sr.
Robert Gray, DTE
Barry Burke, DTE
Sheila Haythornthwait
Dennis Soboleski
Roland Phelps
Wendel Matthews
Marty Nelson
Sue Duvall

High School Teacher Excellence Award

Gary Boats
Overlea H. S.
Baltimore County

Elementary School Program Excellence Award

Gerald P. Bush, III
Clearspring E.S.
Montgomery Co.

Middle School Teacher Excellence Award

Larry Pekofsky
Elkridge Landing M. S.
Howard County

Middle School Program Excellence Award

G. Daniel Wood
Ellicott Mills M.S.
Howard Co.

Elementary School Teacher Excellence Award

Teresa Sadighin
Samuel Ogle E. S.
Prince George's Co.

High School Program Excellence Award

Quinn Patterson
Gwynn Park H.S.
Prince George's Co.

Lifetime Achievement Award

W. Harley Smith
Prince George's Co.

Maryland Advocacy Award of Excellence

William Gluck Engineering Society of Baltimore

Maryland Technology Leadership Award

Barry N. Burke, DTE
Montgomery Co.

New Teacher Excellence Award

Marc Rosenberg
Liberty H. S.
Carroll Co.

Dan Spotts
Diversified Education Systems

Robert E. Lee
Autodesk/ Avatech Solutions

Ron Elkins
The Boeing Company

TECHNOLOGY EDUCATION

Technology Education Leadership Project

Robert C. Gray

The Technology Education Leadership Project (TELP), a $1.2 million project funded by the National Science Foundation and administered by the University of Maryland Eastern Shore, is developing Maryland's leaders in Technology Education. Ninety Teacher Leaders from across the state are currently participating in intensive training related to the core technologies, instructional strategies, information systems, and leadership skills. Each Teacher Leader is part of a local planning team that is developing in-service activities that will take place this coming year.

In early October, the TELP Teacher Leaders attended the first of four Weekend Institutes to be held during this school year. Leaders from the Western counties of Maryland met at Westmar High School in Allegany County and received valuable information on Biotechnology from Dr. John Wells of West Virginia University. Optical Technology was the focus of activities for Teacher Leaders from the North Central Region who gathered at Dulaney High School in Baltimore County. Oxon Hill High School was the site of the South Central Region Institute that dealt with Mechanical Technology. This session included a presentation by a representative from the American Society of Mechanical Engineers. Teacher Leaders from the Eastern Shore gathered at St. Michael's High School with activities focusing on Thermal Technology. Each of these sessions also included a presentation on "Planning Effective Professional Development Activities" delivered by one of Maryland's distinguished Technology Education administrators.

Maryland's TELP Teacher Leaders are taking part in 12 Weekend Institutes and four weeks of Summer Institutes over the life of the project. They are working with their local supervisors to develop in-service for up to 20 other teachers in their school system. The result of these efforts will be improved instruction that will prepare Technology Education students to effectively use, assess, design, and produce technology. By focusing on the nine core technologies, proven teaching/learning strategies, and the cultivation of leadership skills, the Technology Education Leadership Project is making a major contribution to the development of Technology Education in Maryland.

Publication Guidelines

A survey of members at TEAM's Annual Business Meeting at EXPO '97 indicated overwhelming support for a professional journal. In response, TEAM has published this journal. Our primary goal is to create a useful and interesting forum for Technology Education professionals. We are most interested in teachers communicating their ideas.

What might you submit to the journal? Short and practical items will be in greatest demand. Not all ideas need to be original, but the topic and techniques should be treated from your perspective. Each manuscript should include the importance of the idea to the classroom setting. Information and ideas should be interesting and useful to classroom teachers. Student-ready work sheets and activity descriptions are welcome. For classroom activities, be sure to include:

1. your practical experience with the activity,
2. how often you have used the activity,
3. techniques for managing the activity,
4. assessment procedures, and
5. for what grade level it is appropriate.

The maximum length for manuscripts is 1,000 words - about 4 typewritten, double-spaced pages. This guideline will be strictly observed. We prefer short, concise articles. Submit only unpublished original manuscripts. We encourage you to submit an idea for appropriate artwork. All photos must have signed releases for identifiable parties. All sources must be referenced.

After sending a manuscript for publication in the TEAM Journal, you will receive a letter of acknowledgment from the chairman of the Editorial Review Board. Manuscripts will be sent to at least three reviewers. Manuscripts accepted for publication will normally appear in the current year's journal.

When submitting your manuscript please label all parts (pages) with your name and address, including photos and illustrations. Include both school and home addresses, phone number, fax number and e-mail address.

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Get Ready for MSPAP - Join The Turtle Race

John Hollyfield

The Turtle Race is an Ingenuity Challenge for middle school Technology Education students that incorporates Maryland School Performance Assessment Program (MSPAP) skills. Designed as a semester-long activity, the Turtle Race integrates the Core Technologies (materials, mechanical, and structural) into a student-centered, hands-on activity. Students design and construct a vehicle that will travel down a sixteen-foot incline at the slowest speed.

Developed by Charles County technology teachers John Hollyfield and Steve Crescenze with help from Instructional Specialist, Christine Smith; the Turtle Race Challenge provides students with multiple opportunities to practice critical skills such as reading to be informed, reading to perform a task, and writing to inform. These activities are creatively woven into the design and development process. The writers have developed Student Resource Booklets, Student Answer Booklets, Teacher Resource Booklets, and other well-designed support material for the project.

Lessons and experiments related to mathematics and science concepts provide a knowledge base from which students begin to develop a solution to the problem. The collection of data can be analyzed in this phase and used to design the vehicle. Instruction on multi-view drawing enables students to develop working drawings of their vehicles. The effective and safe use of tools and equipment are key instructional elements as the vehicle begins to take form. The culminating activity in this exciting project is Final Race to determine who has made the best use of friction to design the slowest vehicle.

Students document the problem-solving process in a portfolio that contains all of the innovative work sheets developed specifically for this activity. Examples of these work sheets follow this article.

Technology Education programs must be contributors to the overall academic achievement of all students. By integrating MSPAP skill development into an Ingenuity Challenge, students are required to apply knowledge and skills to the solution of a fascinating and challenging problem.

If you would like more information on the Turtle Race contact John Hollyfield at the address below.

John Hanson Middle School
12350 Vivian Adams Drive
Waldorf, MD 20601

The Turtle Race

Friction

Introduction: Reading to be informed.

Friction is the resistance to motion between two objects that are in contact with one another. An easy way to experience friction is by rubbing your hands together. As you do so, you will feel resistance to motion. You also will feel heat. The heat is produced as the mechanical energy of your hands is converted to heat energy.

Friction has both good and bad points. On the good side friction can be used to control mechanical energy. For example, friction is used to stop or slow the motion of most transportation vehicles. The braking system of a bicycle is a good example of a braking system that uses friction. (See Fig. 2-6)

When you apply the brakes of a bicycle, you cause small brake pads to rub against the bicycle wheels. This rubbing action converts the mechanical energy of the moving wheels into heat energy. It is this conversion process that allows you to slow and stop the bicycle.

In the case of stopping vehicles, friction is very useful. However, friction also has its bad side. Friction causes moving parts of machines and equipment to wear out. When parts rub together as they do inside engines, motors, and most machines, friction eventually causes parts to fail. This wearing process can be reduced by making the parts smooth and by keeping them lubricated.

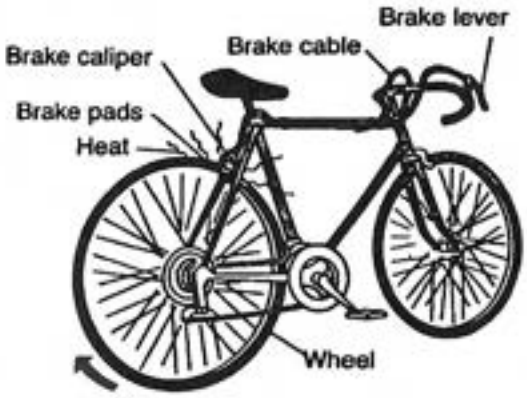

Fig. 2–6. Friction is used in stopping a bicycle. As the brake pads press against the moving wheel, mechanical energy is converted into heat energy.

Task 5

Part I. *Now, that you understand how to design and build your car, the next step is to understand the role friction plays in making your car a winner.*

Today you will be ***reading to be informed.*** *When you read to be informed, you will do the following:*

- ***Determine what you want to learn or find out from the material.***
- ***Skim to find out how the author has chosen to present the information.***
- ***Think about something you may not have understood; go back and reread that part.***

Turn to the selection entitled "Friction." Read and complete the following stance questions:

1. *What is friction?*

_____

_____

2. *Based on what you have read and from your own experiences, complete the graphic organizers found on the following page, using the phrases listed below.*

-Wheel and body/frame
-Wheel and axle
-Body and track/guide rail
-Between tire and road/track
-Foot against pedal
-Axle and body
-Wind resistance
-Brake pads against tire

Bicycle

Areas of friction

ADVANTAGES	*DISADVANTAGES*

Turtle Race Car

Areas of friction

ADVANTAGES	*DISADVANTAGES*

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❒ Male ❒ Female

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INTERNATIONAL TECHNOLOGY EDUCATION ASSOCIATION

Ingenuity Challenge

developed by

Rick Avondet
Oxon Hill High School
Prince George's County, Maryland

Dennis Hearn
Parkville High School
Baltimore County, Maryland

Challenge: Design and fabricate a structure that protrudes horizontally from its vertical support, bears its own weight and an additional load.

Tools and Materials:

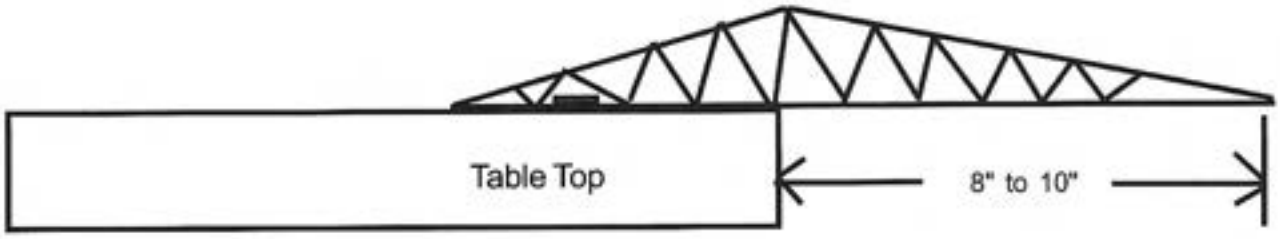
30 Straws
24 inches of masking tape
Scissors
Graph Paper
One 3" x 5" index card
2" of string
Ruler

Specifications:

1. The cantilever must protrude at least 8" from the edge of the table and no more than 10".
2. The base of the structure must be designed so that it will fit within the area of a 3" x 5" index card.
3. The cantilever must be designed to hold a weight suspended from a string at the end of the cantilever.

Rules:

1. While testing, the structure may be secured to the table only by the weight of a 12 " wooden ruler, slipped through the structure perpendicular to the cantilever.
2. The structure is considered to be standing until the failure point is reached.



Teacher Notes for Cantilever Challenge

This is a group activity. Students will work with a partner to design, construct, and test the structure.

Design Procedure:

1. Each team member will complete at least two thumbnail sketches of possible designs.
2. From the thumbnail sketches, the team will select a design to construct and test.
3. Teams will make a working drawing of the design on graph paper.
4. Team members fabricate the structure.
5. Team weighs and records the weight of the structure.
6. Team members test the structure's capacity.
7. Team members record the weight held by the structure.
8. Team calculates the efficiency of the structure using the following formula.

$$\text{Efficiency} = \frac{\text{Live Load}}{\text{Dead Load}}$$

Summary and Evaluation

1. Teams will make a written report and oral presentation of their recommendations for further refinement of the solution to the challenge.
2. The class will analyze the various solutions and summarize the factors which contributed to the successful designs.

Assessment and Evaluation of Student Achievement

Evaluation of students will account for student performance in all phases of the challenge activity. The performance of the teams' solutions should not be the sole basis for student grades. Student evaluation may include:

1. performance and documentation of brainstorming;
2. application of systematic procedures for problem solving;
3. performance and documentation of planning;
4. ingenuity in application of science, mathematics, and technology concepts;
5. performance of fabrication techniques and procedures;
6. documentation of testing procedures;
7. use of "feedback" in refining the problem solution;
8. written and oral presentation of recommendations for further refinement of the solution;
9. cooperation and collaboration in the team effort;
10. use of class time; and
11. note taking and participation.

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Please List the Major Goals (5 maximum) of Your Presentation:

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Please Provide a Brief Outline of Your Presentation: (on a separate piece of paper)

Applications must be signed to be considered for the 2000 Expo. Please return your completed application and presentation outline to Adam Sheinhorn, 10920 Route 108, Ellicott City, Maryland, 21042. Presenters are also encouraged to develop their presentations into articles for publication in either the TEAM newsletter, or the TEAM journal.

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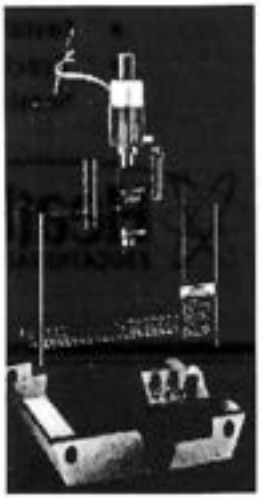

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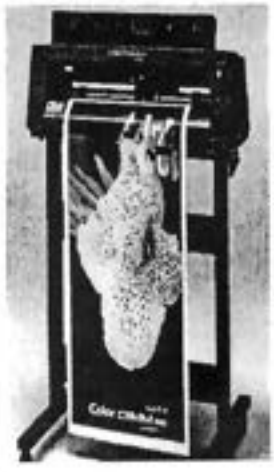

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