Maryland

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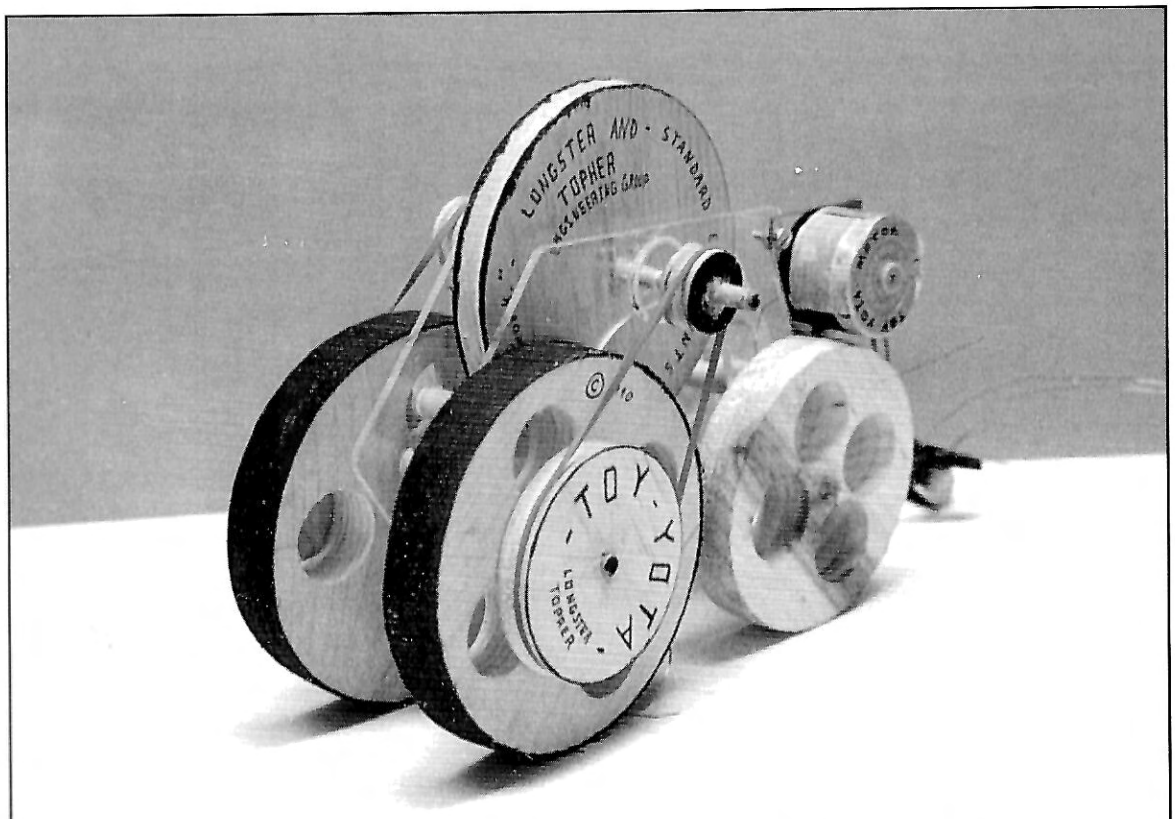
TECH EXPO 2001 OCTOBER 19, 2001



MARYLAND ENGINEERING CHALLENGES

Tractor Pull Challenge

(See page 26)

TECH EXPO 2001 OCTOBER 19, 2001

MARYLAND ENGINEERING CHALLENGES

2002 CHALLENGES

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Tractor Pull Contestants Face Judges

High School Wood Bridge Challenge	Saturday, February 16, 2002 Baltimore Museum of Industry
High School Tractor Pull Challenge	Monday, February 18, 2002 Engineers Club, Baltimore
Elementary School Challenges	Saturday, February 23, 2002 Baltimore Museum of Industry
Middle School Challenges	Saturday, April 13, 2002 Baltimore Museum of Industry
High School Challenges	Saturday, April 20, 2002 Baltimore Museum of Industry Alternate date for Bridge Challenge - April 7, 2002
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Maryland Technology Teacher

Journal of the Technology Education Association of Maryland

Vol. 3 **Fall 2001**

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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.

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President's Perspective

Adam J. Sheinhorn

As teachers we wear many hats, taking on a wide variety of responsibilities. Not only are we expected to pass along our content knowledge to our students; we are their advocates, counselors, big brother or sister, and sometimes, their surrogate parent. I firmly believe that these responsibilities are what make us special. Only a select group of people have the dedication and love for children to accept this type of responsibility.

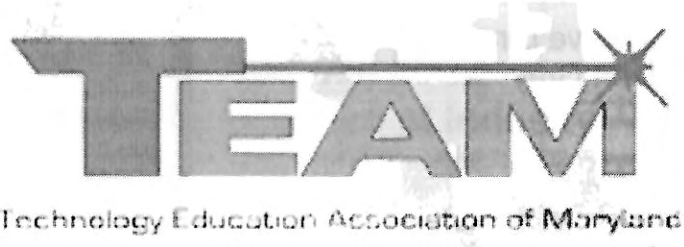
As technology education teachers, it is important to remember that we are teachers first and "technology education" teachers second. Within our content area, we are one piece in a complex puzzle designed to give our students a quality educational experience. As we look at the changing roles of our schools, it is important that we establish ourselves and our programs as an integral part of the modern educational movement.

There are several initiatives at the forefront of Maryland schools. Improving the reading ability of our students is at the top. We (the educational community) need to consider what is best for students. Should we schedule students for additional reading courses if the format of those courses isn't meeting the students' needs? A more promising alternative would be to redesign reading instruction in such a way that it is put in a context that is familiar and of interest to students. This should be where we come in. Teachers of every content area should play a role in developing the reading ability of our students.

Another initiative is improving MSPAP scores. If you have proctored the MSPAP you are aware of the strong connections to technology education. Teachers and supervisors of technology education have tried for several years to make the case that we support MSPAP. It's time for a new approach. As you develop lessons and materials of instruction, go the extra step to design your materials after MSPAP. Use the icons and structure your questions after the various stances. Make a point of periodically dropping copies of your successful lessons in your principal's mailbox. Let him or her know about the contributions technology education is making to improve MSPAP results in your school.

The final initiative I'll discuss is the implementation of high school assessments. This is emerging as a national trend and is about to begin in Maryland. Although the first set of assessments are in English, math, science, and social studies, don't overlook the importance of technology education, both at the middle school and high school level. If you aren't already, become familiar with the Maryland Learner Outcomes and the Core Learning Goals. At a minimum, if we say that technology is the application of math and science, then we certainly should use the Maryland Learner Outcomes and the Core Learning Goals in the planning of our instruction. In addition to referencing these academic standards, collaborate with the English, math, science, and social studies teachers in your schools. The pressure of the high school assessments is not going to be limited to grades nine through twelve. Middle schools are and will continue to be expected to aid in the preparation of students for these assessments. For this reason, middle school technology education teachers need to realize the importance of not only modeling MSPAP, but also documenting support of the high school assessments. In addition to showing the role technology education plays in the successful completion of these tests, documenting your support will also reinforce how technology education integrates with other subjects and contributes to students successfully completing a well-rounded public school experience.

It is important to remember that as a technology education teacher, you are a part of at least two teams: 1) a cadre of talented technology educators across Maryland and 2) a school-based community of teachers that is charged with preparing our young people for the society that awaits them. Although teachers are asked to wear several hats, keep in mind that each hat is equally important. By integrating the premises of reading, MSPAP, and the high school assessments, you are making it possible for your students to excel. The technology education community has spent a great deal of time establishing itself and its worth in public education. Let's continue to look at the big picture and broaden our scope to include our ultimate goal... educational success for all students.



Leadership

A few thoughts...

Ken Smith

The Technology Education Leadership Project (TELP), is an innovative and most timely program designed to identify and develop a cohort of individuals who will lead Technology Education in our state. It has been my pleasure to serve as one of the individuals who presented leadership training for the past three years. It has been encouraging to meet educators from all areas of the state and share successes and challenges related to Technology Education.

My approach to these leadership discussions was rather informal. Yes, I did include a formal presentation about 'Facilitative Leadership' which offered valuable information about a 'process' for leading others towards common goals. I will assume that information has been reviewed and applied by the TELP group to address challenges in their respective school districts. It is a very effective process. But, I do not want to revisit specific strategies or techniques related to facilitative leadership in this discussion. Rather, I prefer to offer a few personal thoughts about leadership specifically connected to the unique struggles found in Technology Education.

First, I believe all Technology Education professionals agree that we are involved in an instructional program that is in flux. It has been difficult to tame the beast. The entire history of our curriculum has been marked by frequent and diverse change. I once asked a small group of Technology Education teachers to quietly write answers to a series of questions about their profession. This group was fairly diverse in terms of professional experience, ranging from 2 years to 31 years of service. The responses were unsettling, yet important evidence of our dilemma. Who are we? What exactly do we teach? What are the benefits for students in Technology Education? What role does this instruction play in terms of student performance on state assessments? These are just a few examples of the questions posed to the group. Unfortunately, the responses revealed widespread disagreement within the group for each question. How can this be? Is this a good or bad thing? Does there need to be consensus and agreement on these issues? I hope everyone answered YES.

I believe the current leadership for Technology Education in our state has worked very hard to establish a meaningful and relevant program for all students. In 1993, the Maryland State Board of Education seemed to agree and rewarded our efforts with a new graduation requirement for Technology Education; the first in the nation to have such a mandate. Our work had just begun. Eight years later, we are faced with numerous challenges such as, but not limited to; certified teacher shortage, program consistency statewide, understanding of program by general population, overall value to state assessment initiatives. I mention these not to be negative, but rather to stress the importance of the 'leadership' component of TELP. The single most critical part of the TELP experiences may have been the discussions and presentations on leadership. Without key individuals to 'lead' others in our profession towards consensus and direction, we will be targeted more easily for program reductions or elimination. That trend is already here. Of course, there are numerous reasons why programs face such an outcome. As local districts make hard choices about curriculum and performance on state assessments and other measures of school success, programs that contribute to that success will survive. I believe Technology Education can and should remain part of the 'core curriculum' in all schools. This will occur with strong leadership and commitment. The TELP participants need to recognize this responsibility and continue the essential work of internal and external communication. Before we can promote the value of a program to others, I believe we must work hard to build agreement among the Technology Education professionals statewide.

We have so many successful and dynamic programs around the state. These teachers and their efforts must be showcased as often as possible. These individuals must be recruited to a leadership role. Because of their skill and success, we will all benefit. Teacher recognition and program promotion is a critical strategy for all leaders in our field. Every success requires documentation and sharing with colleagues, parents, administration, and community. All program marketing opportunities must be seized. My experience in this area has produced significant dividends. When I have not done this, bad things happen.

'Letting others do the talking for you', is a very effective strategy for promoting successful programs in your districts. When members of the business community become advocates and supporters of your teachers and their work, good things happen fast. I shared numerous examples of this during my presentations with TELP participants. I wanted them to understand that this is one of the most effective ways to

rapidly gain support for Technology Education locally. Related to this approach, every effort should be made by Technology Education professionals to establish strong relationships with your colleagues in mathematics, science, social studies and language arts. Seek partnerships through collaborative initiatives such as engineering competitions, blended instruction activities, internal committee work, consortiums, etc. Again, when core subject colleagues speak for you about the value of Technology Education, you have successfully demonstrated leadership by allowing someone else to do the talking.

I want to suggest that before you seek 'external' sources of support for your local Technology Education program, you must first make sure the 'internal' homework has been accomplished. That is, the Technology Education professionals must seek to share the same vision, mission and goals for curriculum development, program implementation and assessment. This can be the most challenging part of leadership- internal change among professionals. Careful guidance of a group of teachers who may or may not share the same philosophy, vision, or goals can be overwhelming. It is essential that leaders emerge who are knowledgeable and committed to bringing the group together for the greater good. This continues to be my greatest challenge as an instructional supervisor. My goal is to be able to distribute those questions that I mentioned in the beginning of this discussion, and have my teachers and others around the state respond with a shared vision, mission, goals, content and attitude about Technology Education. I hope to witness a time when our curricular area is truly a 'core subject' in all school instructional programs. I know this will not occur without continued strong leadership. I feel confident that the members of TELP are ready to meet this challenge.

Ken Smith is Director of Career and Technology Education in the St. Mary's County Public Schools.

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Preparing Future Leaders in Career and Technology Education

Gerald F. Day

Within the next five years, over 50% of the present Maryland teachers and administrators in Career and Technology Education will be eligible to retire. This presents a challenge. Where will Maryland and the nation get individuals to fill the leadership roles of classroom teachers, resource teachers, school-based administrators, local central office personnel, and state education department personnel in the field of Career and Technology Education?

Leadership has been defined as the ability to motivate others to work toward a common vision or goal. A leader is an individual who has the vision and special set of skills to organize and motivate people to effectively accomplish the goals and objectives of an organization. Leaders are viewed by others as having a high degree of honesty and integrity.

In 1999, the Department of Technology at the University of Maryland Eastern Shore (UMES) initiated a new Master of Education (M.Ed.) in Career and Technology Education. One of the goals of this program is to prepare future leaders in Career and Technology Education.

Program Description

The masters program in Career and Technology Education is designed to refine one's knowledge and skills to become master classroom teachers, resource teachers, specialists, and administrators in Career and Technology Education. The program is also designed to prepare teachers and educational leaders to qualify for Advanced Professional Certification (APC) in Maryland.

Coursework is offered at UMES, the Maryland Center for Career and Technology Education Studies located at the Baltimore Museum of Industry (BMI) on Key Highway, and other University System of Maryland (USM) institutions that offer graduate courses in education. The program has two strands: one in **Technology Education** and another in **Occupational Education.** UMES offers the specialized content and methods courses related to Occupational and Technology Education. In collaboration with UMES, other USM campuses offer the professional education courses for transfer to the UMES program. The course of study varies with the experience and qualifications that individuals bring to the program.

Goals and Objectives

The overall goal of the graduate program is to prepare individuals to become master teachers, administrators, and leaders who are committed to developing, instructing, coordinating, and directing quality programs in Career and Technology Education. The following program objectives assist in accomplishing this goal:

- Provide opportunities for teachers to gain advanced professional knowledge and skills in Career and Technology Education.
- Prepare individuals to build upon the content knowledge they have acquired in the baccalaureate degree by providing additional professional knowledge and content necessary for advancing careers in teaching and administration.
- Prepare teachers and leaders who are knowledgeable in research, theory and practice related to effective classroom and laboratory instructional management.
- Develop teachers and leaders who are committed, continuous learners, and contributors to the enhancement of the teaching profession.
- Prepare teachers and leaders who demonstrate sensitivity and effective interpersonal skills in working with culturally diverse populations.

Requirements

Students enrolled in the M.Ed. program complete a state-approved program of study that includes at least 30 semester hours of graduate credit with a cumulative 3.0 or higher grade point average. Six (6) credits are required in a capstone research experience. Of the remaining 24 credits, six (6) will be required in Occupational or Technology Education and six (6) will be required in professional education. Twelve (12) elective credits are selected with approval of the graduate advisor based on the student's previous educational experience and career goals. Students take a written comprehensive examination and complete an action research seminar paper within the last six credits of their program.

Students must complete the program within three calendar years of advancement to Master's Candidacy, but no later than their five-year admission period. Full-time candidates in the Career and Technology Education M.Ed. program can complete the program in one academic year including one summer. Part-time students, who attend uninterrupted, can complete the program in three years.

Program Competencies

Individuals who complete the M.Ed. program in Career and Technology Education are expected to demonstrate successful achievement in the following:

- Knowledge of the philosophy, mission, vision, goals, and the evolution of Career and Technology Education.
- Knowledge and application of the core technologies identified in the *Maryland Curricular Framework for Technology Education.*
- Application of research and inquiry for the improvement of classroom and laboratory instruction.
- Understanding of the learner's physical, cognitive, and emotional development, and the implications for learning and instruction.
- Knowledge of the social contexts in which education occurs, the philosophical perspectives which influence teaching and learning, and an understanding of personal beliefs related to the role of the teacher and the learner.
- Skills and knowledge necessary to assist learners with special needs and diverse cultural backgrounds in an instructionally-integrated setting.
- Ability to organize and manage a classroom and laboratory on the basis of research, best practices, expert opinion, personal attributes, and student learning needs.
- Development of a variety of teaching and learning strategies and techniques.
- Appropriate use of a variety of approaches to assess and evaluate instructional outcomes.
- Use of technology, including computers and media, for classroom, laboratory and professional needs.
- Application of theory and best practices in classroom laboratory situations through field experiences.

Summary

The fields of Technology Education and Occupational Education will be in need of leadership in this decade. With a massive retirement cycle upon us in a time of great growth and reform, it is important for individuals to step forward and provide the leadership that is needed to keep Maryland's educational programs among the best in the nation. Enrollment in and completion of the University of Maryland Eastern Shore's masters program is one pathway to develop these leaders.

Gerald F. Day, PhD, is Coordinator of Graduate Studies, Department of Technology, University of Maryland Eastern Shore.

Maryland Technology Teacher

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THE IMPACT OF DIGITAL TECHNOLOGY:
THE DESIGN AND RENOVATION OF SCHOOL FACILITIES

Lawrence Ryan

The information age and digital technology has not only changed the way the construction industry does business but how it does business for schools and what people do inside the school buildings that are built.

Until very recently the construction industry paradigm has been the factory, where many people work together to make complicated products. That same factory paradigm has been applied to homes and schools.

In the twenty-first century this paradigm is changing. The rise of the virtual workplace now means that physical proximity to work or school is no longer an essential. One of the biggest questions for school researchers today is what the school buildings of the 21st century will look like, and what kind of buildings will we be building?

It is also true that the construction industry has used drawings and information on paper as they have been doing for the last fifty years, until just the last few years. Now with the integration of the digital technology; computer, television, and telephone, construction costs for many buildings could be dramatically reduced.

Also, just now, industry is awakening to the tremendous potential of the new technologies. This is in part due to the fact that cost per byte of information has been falling and at an increasing rate. Now desktop computers are able to do the work that mainframe computers of just ten years ago were only able to accomplish.

Advances in digital computer and information technologies, now a reality, are dramatically changing the way homes and schools are being designed and built. Some specific examples of how digital technology is changing the way school technology labs and their programs are designed will follow. The intent is to show the impact of our advancing digital culture on the physical space and the programs being offered in technology education.

The impact of the digital age on teaching, learning and on the design of the space where this all takes place is broad and diverse. The "Technology of Teaching" however may not necessarily involve just the use of digitized information. Today all teachers need not only to be able to use educational technology, but to know and understand how learning can best be facilitated by the combination of all of the resources they have at their disposal. The responsibility of the technology teacher and the administrator is to unite the use of technology with theories and practices of learning in a laboratory that reinforces student learning with a place for a practical application of these tools and skills.

Since one of the goals of teaching technology in education is to provide instruction on technology that is applicable for use in the present and the future workplace, laboratory design must reflect this philosophy. The facility must be able to support instruction on technology that is able to meet current technological needs. This necessitates access to the tools of digital technology. The current technology lab must include computer stations that support Internet access, and applications for CAD, presentations, spreadsheets, word processing and desktop publishing. These applications are all in favor in local industry. The reasons for the demand for digital information are clear. Manipulating digital data provides cheaper, faster, better results. What business is not interested in improving the bottom line and thus enhancing profits? What schools and what teachers are not interested in improved student performance?

Even though students are not necessarily expected to meet advanced competencies, the facility should support experiences that provide background and will support and facilitate the ease of acquisition of future technology. As is the case with many of the skills, tools and knowledge related to the use of technology, their acquisition is cumulative. For students and teachers to be literate in the technical knowledge required to be successful in 2010, the transition will be faster and more direct through knowledge and proficiencies in current day technical applications. To try and make the transition to 2010 technology from that of 1990 will require a much more concentrated and intensive learning, which would in turn exclude many from access to the early 21st century workplace which will be dependant on this literacy. This may however, be true less for students than for teachers. The eminent MIT technologist Seymour Pappert observes that what is astounding to him is how incredibly fast younger children adapt to everyday uses of novel technologies. So much of our culture is evolving around the use of digitized information; students are able to construct meaning and new knowledge from an already sophisticated knowledge base. This supports constructivist learning theories. It is therefore incumbent upon administrations to both support growth and development of technology programs and to support teacher-training programs in new technologies.

Many school systems lag far behind in providing tools and skills of the current digital technology, and an appropriate space where these tools and skills can be used in authentic learning. Primarily, schools need to engage in the process of recruiting and holding qualified faculty to support the ongoing transition into the new millennium. Recruitment of personnel committed to ongoing staff development and a disposition towards lifelong learning will be a chief concern for school administrators. The training and retention of personnel through paid workshops and salary incentives will be in addition to the cost of maintaining and upgrading current tools of digital technology and labs for developing technological literacy.

Providing students equal access even to current technical literacy has broad implications for school systems across the United States. One of the challenges to schools and for all teachers is to bridge the "digital divide" to provide technology education that will empower and enable all students access to the tools of the 21st century. The technology education tools of which I am speaking, that which enables information to be digitized and decoded, challenges policy makers and teachers to be made available equitably to all students.

Currently school facilities across the nation are in decline. In a report recently made by the National Center for Education Statistics (NCES) three quarters of all schools reported that money is needed for renovations, repairs or modernizations to raise their school to "good" condition. The total cost for this nationwide was estimated at $127 billion. The average cost per school was 2.2 million. The following are some excerpts from the NCES 1999 report:

- Ventilation was the environmental condition most likely to be reported unsatisfactory.
- One-fourth of schools reported needing air-conditioning. Schools in rural areas and small towns were more likely than schools in large towns and urban fringe areas to report that at least one of their environmental conditions was unsatisfactory.
- Over half of the schools reporting less than adequate conditions of at least one building feature had no plans for improvement.

The most accurate indication of a school's age is not the actual age of the building, but the functional age, which takes into account the history of its maintenance and renovations. The functional age is defined as the age of the school based on the year of the most recent renovation or the year of construction of the main instructional buildings if no renovation has occurred. The average age of public schools in 1999 was 40 years, based on years since original construction. The average functional age of schools was 16 years. Schools that were relatively old in terms of functional age were more likely than newer schools to report inadequate or unsatisfactory conditions.

About a quarter, 17,400 schools were overcrowded (enrollment more than 5 percent above their capacity). Large schools were more likely than other schools to be seriously overcrowded, and small schools were most likely to be seriously under-enrolled. Schools with a high minority enrollment (more than 50 percent) were most likely to be seriously overcrowded. Schools that were classified as overcrowded were more likely than other schools to report that at least one type of onsite building was in less than adequate condition. Thirty-six percent of schools reported using portable classrooms, and 20 percent reported using temporary buildings. Most reported using portable and temporary instructional space as a result of overcrowding.

A growing body of research has linked student achievement and behavior to the physical building conditions and overcrowding. Good facilities appear to be an important precondition for student learning, provided that other conditions are present that support a strong academic program in the school.

As we experience the renovations and upgrades to our facilities, we are also reducing the size of our workspaces. It is not just the fact that the cost per square foot continues to rise, and the competition for education dollars is increasing, but also the fact that digitized lab designs are more efficient and save money. It is the advancing use of digital technology that is helping to make efficient use of space. Today the computer has the ability to create virtual laboratories and virtual workspaces. Anyplace that can be built can first be computer designed and space relationships can be analyzed with "3D" walkthrough software. This enables designers to maximize every cubic inch of space. The efficiency that is derived does not stop with the "virtual walkthrough". Ordering materials, scheduling tasks and operations, and many other steps in the design and construction process are shortened and thus will save money. On the downside, once the "less wealthy" school systems find out that digitized plans for schools and classrooms can be easily copied, there is an increased likelihood that "cookie cutter" shoe-box design will coagulate architectural style. This development applies to all aspects of school design.

Recent proposed Federal legislation would hopefully make the needed upgrade to school facilities nationwide possible. To help communities nationwide modernize their schools, President Clinton called on Congress to pass his school construction proposals: $25 billion in School Modernization Bonds and $6.5

billion in Urgent School Renovation Loans and Grants.

In the U.S. House of Representatives, Reps. Charles Rangel (D-NY) and Nancy Johnson (R-CT) introduced bipartisan legislation (H.R. 4094) in 1999, based on the President's proposal. In the Senate, Sen. Charles Robb had introduced a similar bill. The Johnson-Rangel "America's Better Classrooms Act" had 224 co-sponsors--more than half the members of the U. S. House of Representatives. The proposal would create $24.8 billion in school construction bonds that would be interest-free for school districts and would help modernize 6,000 schools nationwide. This bill was reintroduced in the week of March 12, 2001 as HR 1076 and was strongly endorsed and recommended by the National PTA for passage when it came up for a vote in Congress .

The following describes the Johnson-Rangel act that was put forth by the Bush Administration.

School Renovation and Technology Grants: The Department of Education's FY2001 Budget includes $1.1 billion for this new program. The program provides grants to local educational agencies to help them make urgently needed repairs and to pay for special education and construction-related technology expenses. Funds are distributed to states based on Title I LEA grant shares. States distribute 75% of their awards on a competitive basis to local educational agencies to make urgently needed school repairs, such as repair of roofs, plumbing and heating systems or meeting fire and safety codes. The remaining 25% of a State's award is distributed competitively to local educational agencies to use for technology activities related to school renovation or for activities authorized under Part B of the ESEA. School districts apply to the State to receive funding for either purpose.

Technology education teachers nationwide could further the impacts of our digital world on lab facilities by using the internet's powerful communication ability to lobby politicians, and communicate the need for colleagues to get behind the promotion of this proposed legislation through e-mail and promotion on association websites.

Our ability to create digital data will continue to create impacts on the design of school labs in both the short and long term. The extent to which this occurs is mirrored by how current data control methods have an impact on almost every aspect of our culture (economic, political, social, and environmental.) It becomes especially critical that we be informed as to the depth and breadth of how the knowledge, tools and skills of our day have an effect on what we do and on the unique venue in which we perform our service to students.

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Larry Ryan is a technology teacher in Worcester County Maryland and a graduate student at the University of Maryland Eastern Shore.

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Integrating Internet into the Curriculum

P. A. Wiedorn

Integrating the Internet into the curriculum provides a method for using the Internet to support the Technology Education Curriculum. The objective is to make effective use of the Internet in classrooms. The method includes lesson plans. The essence of the method is to develop "Links Pages" to assist students in finding information on the Internet. The method is student-centered and focused on using the Internet to expand and enhance the existing curriculum.

An important goal of Technology Education is to incorporate math, science, and other subjects into practical problem solving. *Standards for Technological Literacy,* Standard Number 3 states that "Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study" (ITEA, 2000, p. 44). To do this properly requires resources not available in most schools. As a result we often plan on having our students learn about an important topic and end up having them learn how to make a small vehicle. For example, we may plan on our students learning how magnetic levitation trains can be designed, constructed, used, and controlled, but end up having them learn about how to shape a Styrofoam™ block and add a motor and four permanent magnets.

Students should be looking up information about the topic while they are building the prototype of their product. This information could be about real-life applications of the technology or about how better to solve the specific problem at hand. Math and science explanations should be available for students to access when they are ready for it. Students should document the results of their research in the background section of their reports.

Reference material is needed. The library might be the solution, but even a well-stocked library may have only one of each good book on the subject.

The Internet provides a wealth of information that can be accessed by every student at the same time. To use the Internet effectively (even if it is readily available to every student) you must avoid two critical problems. The first problem is that students can waste a lot of time trying to find useful web sites and may not be able to distinguish good information from garbage. The second problem is that it is all too easy to wander off topic while surfing the web.

The solution to both of these obstacles is to have a group of experts search the web, find a small number of good sites, and then provide a list of these sites (along with a critique of each) to the students. This list can take several forms, from a local HTML file to an Internet page. We will call these lists *Links Pages.*

Background

We are in the third wave of computers in education. The first two waves have, for the most part, failed. Realizing the potential of computers to enhance our curriculum will not succeed in this, our third attempt, unless we as technology educators learn from past history.

Teaching Machine

In the first wave computers were envisioned as the teaching machine. The teacher was expected to become obsolete as students sat in front of computers and worked through programmed instruction. The computer could give each student individual custom instruction by tailoring lessons to the results of the previous assessment. While one or two of these programs still exist, they are characterized by significant teacher interaction. Most schools realized that the dynamic interaction between students and expert teachers could not be replicated by a machine.

Computers for Computers Sake

In the second wave, computers were the end and not the means. The goal was to teach computers for computers sake. The rational was that students should learn computers in school since they would be using computers on the job after they graduated. Many schools are still using this model. It can easily be identified by the separate computer lab where a trip to the lab is something that fills class periods but is not directly related to the curriculum. This model is still used in many professional development programs (e. g., classes in Outlook Express instead of classes on how to use e-mail to improve teacher-student-parent communications).

The most successful part of this wave was classes in CAD and keyboarding. The nadir of this wave was computers as a reward. Students who completed their assigned work early got to go play on the computer. The net result of computers as a reward is that those students who already are likely to have computer skills get to enhance them, and those students without the skills are denied the learning.

Another aspect of the second wave was to facilitate implementation by using computers for administrative tasks. The hope was that by putting a computer on each teacher's desk the personal and administrative use of computers by the teacher would rub off on the students. Keith Wetzel (1996-97) has shown that training teachers on personal and professional uses of the computer (grade books, word processing, *etc.*) and then giving them computers to use at work or at home has not resulted in greater use of the computer in the classroom. Teachers who receive this kind of training may become avid computer users in their personal life but do not transfer these skills into the classroom.

Supporting the Curriculum

The third wave is about using computers and the Internet to support the curriculum. For this wave to succeed these tools must make it easier for teachers to teach better, not just another thing to teach in an already busy schedule.

Business and industry has been in a similar quandary concerning computers. For years business did not get the productivity gains that they thought they would. For instance, word processors were supposed to reduce the amount of time clerical people spent on typing but this didn't happen. Instead, the ease of making revision meant that documents went back and forth multiple times between the originator and the typist. It was quicker with a typewriter, where one or two errors per page were acceptable (lined-out or with white-out) and originators were reluctant to have a whole page retyped just to improve one sentence.

Companies had almost dismissed the computer as a productivity increaser, then the Internet and other developments brought about the hoped for increase in productivity unbidden and rather unexpectedly. Now the same is being expected of the Internet in education.

Rationale

The best use for the Internet within the existing technology education curriculum framework is as a research tool to support performance assessments. The current curriculum in most of the courses in technology education is structured around the core technology areas of materials, structural, mechanical, electronics, electricity, fluid, thermal, and bio-technology and applying these technologies to power and energy, communications, transportation, and production. Each of these areas typically contains a performance assessment which includes a written report. Part of this report should be the background, or history, of the topic so that students can relate the activity to the real world. Unfortunately, a lack of adequate research material hinders this effort since the school or local library has, at best, a book or two on the subject. The Internet stands poised to fill this gap.

An example of a performance assessment appears in the activity titled *A Very Tall Order*. In this challenge, students investigate the construction of tall buildings by making the tallest tower possible out of drinking straws to support a coffee can full of sand. The object is for students to research the history of skyscrapers and incorporate what they have learned into their design. Instead, students usually become experts at construction with straws, but are not able to relate what they have learned to tall buildings. The Internet can be used to fill this gap in the curriculum. But there has to be Internet access in technology education classrooms and teachers have to know how to effectively incorporate research on the Internet into their curriculum.

How do we get more teachers onboard with the idea of using technology to support the curriculum? According to Gwen Solomon and Stan Solomon (1995), "when teachers believe that technology addresses a need, solves a problem, makes life easier, or offers information they can't get otherwise (or as easily), they will use it. The answer lies in improving professional development" (p. 38). They suggest that we should be "offering the on-going, hands-on sessions teachers need to learn and refine their computer skills... the courses they need to determine how, when, and why technology makes a difference for student learning" (p. 38).

Materials and Resources

This method requires hardware and software support for accomplishment. The required hardware is an Internet connected computer for each participant. Teaching is facilitated if a presentation device is available. This method can be implemented with a variety of software. HTML (hypertext markup language, the format used for web pages) editors can be used. Better yet is to use any of the latest word processors. The latest versions of the commonly available word processors will automatically create a hypertext link when any recognizable URL (Universal Resource Locator, the www) is typed.

Open your word processor and type www.techedmd.org then type a space. If your letters turned blue and the URL was underlined, you have created a hyperlink. Now look through the menus and figure out how to insert a simple horizontal line to separate the various sections. Add a background and save as HTML and you have a web page. The resulting Links Pages can be saved on each computer or on the server for access from each work station.

One advantage of saving the file in HTML format is that students will access your links page using a web

browser, thus preventing them from making changes. When you want to make a change, first open your word processor then open the file from the word processor. You can then modify the file and save it without changing it from HTML format.

Activities

This method includes two lessons for use with the expert group that will be developing your Links Pages and some recommendations for using the results in the classroom. The first lesson is about searching the Internet, the second lesson is about developing Links Pages.

Searching the Internet

Upon completion of this lesson students should be able to use various search engines in order to find web sites on a topic of interest.

Introduce the lesson by showing how the web provides a wealth of information for those who know how to find it. Explain that searches are done using keywords related to the subject. Show how to do this by demonstrating a keyword that looks good but gets no hits, and another (even worse) keyword that gets more than 2,325,341 sites.

Lesson

- Many search engines are available. These include www.ask.com, www.excite.com, www.yahoo.com, etc.
- Remind students of your school's acceptable use policy. The Internet is provided to support the curriculum and should only be used to visit sites related to the topic at hand.
- Choose a topic to search that has some common interest to your group.
- Have the group develop a list of possible keywords to use in the search.
- Cull the keyword list for words that are too common or too obscure.
- Have each student search the topic.
- Each student should tell the class about their top two sites.
- Discuss and brainstorm ideas for how the Internet can be used to improve student achievement

In summary, the Internet can be an effective tool if you understand its limitations and how to effectively search.

Links Page

The second lesson is to actually develop Links Pages. Upon completion of this lesson the students should be able to use a hypertext-capable word processor in order to develop a "links page" for a performance assessment or other technology topic.

Introduce the lesson by using a value line or other method to determine familiarity level with web pages. Show examples of existing Links Pages (figure 1) if you have them. Demonstrate how to use the word processor that you have available to make a links page and save it in HTML format.

The next step is for students to construct or improve Links Pages. Specifically:

- Use brainstorming to develop a list of topics for possible Links Pages. Add pre-existing topics to the list if appropriate.
- Divide the class into teams of 2 students.
- Have each team choose a topic from the list, or assign them if appropriate.
- Have each team search their topic to develop a long list of sites.
- Decide on two or three sub topics for each topic.
- Choose the top 4-7 sites in each subtopic.
- Write a two or three sentence critique of each chosen site. Include the URL in the critique.
- Use the template to create an HTML file for each topic.
- For pre-existing topics, combine the old and the new into one page.

Attributes of a good links page are provided in the Assessment section below. In summary, the goal is to have a list containing a few good sites with an explanation of what is in each. Done correctly, the process involves reviewing and discarding a large number of sites to choose the few best or most appropriate sites.

Classroom Use

Once Links Pages are developed, they should be incorporated throughout the curriculum. The first place is to require their use in explanations of mathematics and science concepts related to ingenuity challenges.

In the one-computer classroom, provisions must be made to give each student equitable access to the computer for searching. Perhaps copies of Links Pages could be put in the library computers or in the computer lab for some students to visit.

In the classroom with multiple computers with Internet access, a copy of the links page can be put on each computer. Better yet, put one copy on the server and let each student access it. The same system can be used in a separate computer lab.

Figure 1.

Wind Power

Brought to you by the students of P. A. Wiedorn at Catonsville High School and by: Joe Depto, Byron Yarbrough, Sam Ellis, Larry Ryan, Patrick Lieb, Kermit Hines, and Kevin Webster.

Search the Internet

Try www.excite.com or www.altavista.com or www.yahoo.com or www.ask.com or www.hotbot.com or www.netscape.com or http://www.aol.com/ or www.google.com or www.infoseek.com

Small Wind Power Systems

A good first site to visit is *The Energy Story*, Chapter 10: Wind Energy at www.energy.ca.gov/education/story/story-html/chapter10.html. It provides a brief overview of wind energy and windmills on a high school level.

Tired of paying your electric bill? Visit *Home Power: the Hands-on Journal of Home-made Power* http://www.homepower.com/. This site is for people who want to generate their own power for home use.

To see what other states are doing visit *Wind Energy: Clean Power for Colorado* at http://www.cogreenpower.org/.

For an overview of wind power visit the *American Wind Energy Association Homepage* at www.awea.org. At this site you can get information about small wind energy systems.

Commercial Wind Power

For the *Windpower Monthly News* magazine go to http://www.wpm.co.nz/. You can learn about companies that are installing wind farms throughout the world.

Visit *Wind Power* at http://solstice.crest.org/renewables/re-kiosk/wind/index.shtml. This is part of a larger site that tells all about alternative energy sources. You can find out about the theory, applications, history and economics of wind power.

For a guided tour of wind energy visit http://www.windpower.dk/tour/. This site is provided by the Danish Wind Turbine Manufacturers Association and may have too many links for your needs.

Research in Wind Power

Want to know what the government is doing? Visit National Wind Technology Center (NWTC) at http://www.nrel.gov/wind/. You can see some good pictures of wind turbines and see what new ideas are being developed.

Visit the U.S. Department of Energy at www.eren.doe.gov/wind/. Provides some good technical information as well as some basics.

Last updated on 26 June 2001 by pwiedorn@bcps.org

Assessment

Many web sites have pages full of links. Usually they are long and have little explanation or critique, making you search every site to find what you want. A good links page should have:

- A title and authors listed (do not include last names of students).
- A list of search engines.
- Two or three sub-topics with 4-7 sites per category. (too many sites is worse than too few. The goal is to only include the best sites.)
- Only quality sites chosen.
- A short critique of each site included with the URL. (Critiques are 2 or 3 sentences long.)
- A pleasing, uncluttered background. (Layout creates interest, but not be too busy.)
- Include a "last updated on" date. Also include an e-mail address for feedback.

A sample links page is shown in figure 1.

Conclusions

Even with Links Pages, students will require continual encouragement to go beyond the prototype to discover the background information. Everyone likes to wander the Internet, so minimize the amount of searching for searching sake. Once you have your Links Pages started, encourage students to find additional good links and add them to your pages (don't forget to remove some links too).

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For information on the Technology Education Association of Maryland go to:

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Agents of Change

Mark A. Kaniski

There is one universal constant that we all must recognize. The constant is change. Change will come. No matter what our views, ideas or ideals may be, change will come. This is part of the human condition. Don't fight it. Fighting change has many, should I say, negative results.

I could go on about the attributes of change, but that would lend itself to a more philosophical topic. As technology teachers and participants in the Technology Education Leadership Project (TELP), we must be observant to recognize when changes are needed. Once recognized, we must act.

Once the need presents itself, how do we go about becoming the agents of change? First thing you must do is take a deep breath. Your work will be cut out for you.

Be clear about what the change will be. Thoroughly research and read through as much as you can. You will need to be well versed in the subject at hand and knowing what you are taking on can only be an asset when you go to make your moves.

Discuss your ideas with others. Change will need community support and the backing from your administration. A good knowledge base on your part and accepting input from others will add validity to the cause.

Input from outside sources will also make people feel a little more comfortable about what you are doing. The attitude of being a "lone wolf" will not help.

Once your ideas have been scrutinized, make a plan of attack. Write your ideas down and the manner in which you will attempt to bring them to a successful conclusion. Nothing will disturb your administration or a community more than going into a venture with the ideas "in your head".

Seeing something on paper or on disc, as the case may have it today, will only lend credibility to what you are about to undertake and give people something they can hold.

Develop a thick skin. You will encounter resistance. Many people develop comfort levels to a routine and become threatened by change no matter how small. These will be your harshest critics.

A way of dealing with these people is to include them in on your quest for outside input. Don't ignore them or pass them off as unimportant. These people must be willing participants for ideas to work. Knowing that they had some input will soften their attitudes towards the change.

Your plans should also include a device to assess the new program. A method of assessment will be another asset that will make a community more responsive to your efforts.

Assessment does two things. The first thing assessment will do is either prove or disprove your ideas. Don't be afraid to change your own plans. If the plan is not working, something must be wrong and should be changed. The second thing an assessment will do is show that there was a real need for change in the first place.

Keep the thick skin. Success will sometimes be harder to deal with than failure. I say this to let you know that you will need to constantly follow up your work. A tenacious attitude on your part will be observed as an asset to anything new that you may try. Don't rest on your laurels. If you did it once and you had a success, you will be expected to do it again.

To the TELP participants, we have been charged as the agents of change. Let us hold true to that commitment. Remember, "It is easier to set the standard than to follow it".

Mark Kaniski is a technology teacher in Washington County, Maryland.

The Technology Educator's Bookshelf

How America's New Independent Workers Are Transforming the Way We Live
By
Daniel H. Pink
New York: Warner, 356 pp, 2001, $24.95.

The author of this book has an interesting array of writing experiences ranging from writing speeches for Al Gore when he was vice president, serving as contributing editor at a national magazine, and publishing articles in several well recognized newspapers and magazines. The element of consistency in all of the above is that Pink's writing always focuses on the subjects of technology, economic transformation, and the future.

This book can be grouped in the same category as Robert Reich's work 'The Future of Success'. While the two books are similar in a broad sense, the manner in which each author makes his case is considerably different. Pink is decidedly more upbeat about the subject while Reich provides a more scholarly treatment.

Pink presents his case in five parts. It begins with three chapters under the heading of 'Welcome to Free Agent Nation'. He focuses on the decline of the importance of organizational workers and the number of them out there. This is then followed by the four ingredients of working on one's own rather than in the employ of a formal business enterprise. These include: (1) the changed relationships between workers and organizations, (2) the impacts of technology, (3) the rise in prosperity brought on by the stock market in the 1990s, and (4) radical changes in the structure and operation of organizations. Having established the above as the foundation of his topic, Pink then goes into the associated impacts upon workers and society. He divides his treatment of the four remaining subject areas in the last portion of the book. The topic 'the Free Way' is well done and relatively easy to understand. The central issue of 'How (and Why) Free Agency Works' lies within this section. Pink clearly explains that being a free agent has many concerns for individuals participating in 'non-organizational' work environments. The drawbacks associated with being a free agent are pointed out. However, Pink under emphasizes the negative effects resulting from the limited accessibility of 'free agency workers' to other units of the workforce, especially regarding their personal happiness. In the final section, Pink delves into the effects of 'free agency living' on retirement; the future of education; and its potential impacts on offices, homes, real estate, finance, politics, commerce, careers, and community. The Prologue is a humorous treatment of how the author arrived at the point where he decided to write this book. As he carefully noted, he calls it a 'ground-level view' of how Americans in the late 1990s and early 2000s work and live. The contents are the result of traveling around the country and conducting one-on-one interviews with several hundred persons who already were free agent workers. In most cases, he uses their actual names.

One of the highlights is that Pink provides a succinct summary at the end of each chapter. He calls these entries 'The Box'. Each box contains four short entries, each of which brings to light significant elements. 'The Crux', the first of them, is a short chapter summary. An important statistic contained there is provided in 'The Factoid', A representative quotation is given in 'The Quote'. Being sensitive to the introduction of novel terms or phrases, Pink extracts a major one from the chapter and presents it. With that clue on what 'The Box' can be used for, Rich states the point of each chapter. Then he urges the reader to consider that the 'narrative and nuance' of each chapter will be missed by reading only 'The Box'.

The author's contention that 'The Box' contains the points of this work is well taken. It is a refreshing approach to books of this nature in view of the time concerns of many readers. On the other hand, the full text is well done. The notes are worthwhile for those seeking more sources. The Appendix contains the results of Pink's 'Free Agent Nation Online Census'. The Index is a useful one. Written in a 'magazine style 'it is easy to read and an interesting treatment of a fascinating topic.

Lynne M. Gilli
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Dr. Donald Maley
A Contribution to the Development of Technology Education

Patrick Lieb

More than fifty years ago, Dr. Donald Maley began to pursue the challenge of combining the theories of education with the components of sociology, psychology, economics, and curriculum development. Between 1947 and 1955, Dr. Maley developed *The Maryland Plan* which emphasized "...the needs of the people and the need to integrate the disciplines of the educational system" (1973 preface). *The Maryland Plan* is a comprehensive document that reflects Dr. Maley's "point of view" on education and "a basic belief in industrial arts" (1973 1-5). Through his work on *The Maryland Plan*, Maley made significant curriculum contributions for industrial arts education in the public school system. As technology advanced and industrial arts became more than just "shop class," the industrial arts course content was updated and the name changed to technology education. Maley's *Maryland Plan,* with its precise definition of industrial arts, became both the foundation for and the focus of technology education.

Defining Technology Education and Industrial Arts

In a 1985 publication entitled *Technology Education: A Perspective on Implementation*, the International Technology Education Association (ITEA) defined technology education as a comprehensive, action-based educational program concerned with technical means, their evolution, utilization, and significance; with industry, its organization, personnel, systems, techniques, resources and products; and their social/cultural impacts (Bensen, 1995, p.14).

Maley (1973) defined industrial arts as those phases of general education which deals with technology – its evolution, utilization and significance – and with industry; its organization, materials, occupations, processes, and products – and with the problems and benefits resulting from the technological and industrial nature of society (p.12).

These similar definitions can be dissected and analyzed for a more profound understanding of their ingredients.

The Maryland Plan as Technology Education

An examination of these two definitions indicate considerable agreement regarding focus of study. The following questions and excerpts from The Maryland Plan illustrate this agreement.

1. *Is The Maryland Plan a **comprehensive, action-based educational program**?*

"As long as industry is a central focus in industrial arts then the phases of general education in such a program will deal with the evolution, utilization, and significance of technology. The study of industry and technology can add reality, concreteness, and relevancy to the student's involvement with science, mathematics, English, history, sociology, geography, and most other subjects. The fast rate of change in industrial and technological developments forces constant updating in program content to meet the needs of people and societies. The program content involved in a living-learning situation investigates the organization, materials, occupations, processes, and products of industry so students can closely approximate life itself. This comprehensive understanding of technology and society also studies the effects and future of industrial applications on the individual and their world. These concepts of the educational process can be actualized through the student-centered challenge or reality approach to learning" (Maley, 1973, pp.3-7).

2. *Is The Maryland Plan **concerned with technical means, their evolution, utilization, and significance**?*

"*The Maryland Plan* employs the anthropological unit approach to have students study the technological development of tools and machines, power and energy sources, communications and transportation, and their contributions to the growth of civilization. These units represent basic elements common to the productivity of mankind. The study of the units will help the students understand their existence and their materialism – to understand that the materialism about them exists only as a point in time, and that their point in time was reached through centuries of struggle and ingenious accomplishment by man" (Maley, 1973, pp.27-65).

3. *Is The Maryland Plan **concerned with industry, its organization, personnel, systems, techniques, resources and products?***

The Maryland Plan utilizes the group-process approach to study industry and its components. There are two methods for facilitating the examination of industry: The Group Project and The Line-Production experience.

"The group project method interprets the project industries that do not have a high volume, but are on a project basis. These would include the space projects (Mercury, Gemini, and Jupiter), as well as the construction of major power-generating systems, ships, airports, buildings, etc. These industries are involved with such elements as unique organizational patterns, indigenous processes, diversity of human requirement, integrated systems, single-product thought and procedures, and different economic structures." (Maley, 1973, p.69).

"The line-production experience is a realistic approach to instruction in the many elements of a volume-producing industry. The activities provide the student with a firsthand encounter with such things as organization, planning, design, tooling-up, jigs, fixtures, production flow, bottlenecks, training, communication, assemblies, subassemblies, fabrication, interchangeable parts, specialization, quality control, finishing, packaging, distribution, and financing" (Maley, 1973, p. 87).

4. *Does The Maryland Plan address* ***the social/ cultural impacts of technical means and industry?***

The methodologies of *The Maryland Plan* develop an understanding through a student investigation of "information relative to the role of technology in the solution of man's problems in the areas of food, water, power, transportation, clothing, shelter, production, communication, pollution, education, health, and safety." These student-centered challenges also seek understandings "relative to technological innovation, such as the need for it, factors contributing to it, its deterrents, and its social and material products." These are some of the "numerous concrete educational activities that can realistically portray to the student the range and variety of problems associated with an industrial and technological society. . ." (Maley, 1973, p.5 & 172).

Summary

During the 1950s, 1960s, and 1970s, *The Maryland Plan* was one of the three new types of technologically-based curriculum structures emerging from the field of Industrial Arts. The Curriculum Committee of the American Industrial Arts Association (now ITEA) wanted to have the leaders of the three emerging curriculum efforts come together and chart a unified direction for Industrial Arts. A significant step in charting a unified direction for Technology Education came with the Jackson's Mill Industrial Arts Symposium Project. This project utilized concepts and content from the three emerging curriculums which included Dr. Donald Maley's - *The Maryland Plan* (Wright, 1995, pp. 254-62).

The phrase "technology – its evolution, utilization, and significance – and benefits" was Dr. Maley's modification of Gordon O. Wilber's definition of industrial arts. Maley (1973) stated "The elements identified in the definition continue to represent a significant study area because of the constant radical changes in industry" (p.3). With his inclusion of the term *technology,* Dr. Maley identified accurately the focus of study for today's technology education program.

This analysis of *The Maryland Plan* was an attempt to interpret the philosophy of Dr. Donald Maley and connect it to the ITEA definition of Technology Education developed in 1985. Dr. Maley's vision for the development of the individual was through self-actualization while understanding and applying the elements of society in a comprehensive, action-based educational setting. He believed that all people should seek knowledge based on self-interest. He also identified the importance of integrating subject matter. Students should articulate their acquired knowledge by researching information, writing reports, conducting seminars, fabricating models, and making group presentations. The anthropological unit, group project, and line-production experience enabled students to investigate the technical means and concerns of industry. These studies are continually adjusted to technological advances but maintain an awareness of the past. Therefore, the philosophy of Dr. Donald Maley and *The Maryland Plan* demonstrate a significant contribution to the development of today's Technology Education.

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Center to Advance the Teaching of Technology & Science (CATTS)

The Center to Advance the Teaching of Technology & Science (CATTS) was established in 1998 to strengthen professional development and advance technological literacy. CATTS initiatives are directed toward four goals: development of standards-based curricula; teacher enhancement; research concerning teaching and learning; and curriculum implementation and diffusion.

CATTS is the professional development arm of the International Technology Education Association (ITEA). ITEA is the largest professional educational association, principal voice, and information clearinghouse devoted to enhancing technology education through experiences in our schools (K-12). Its membership encompasses individuals and institutions throughout the world with primary membership in North America.

CATTS promotes the use of the Standards for Technology Education created from ITEA's Technology For All Americans Project, a nationally supported initiative designed as a basis for curriculum and resources pertaining to the study of technology.

CATTS provides teacher enhancement opportunities through selected programs, workshops, and conferences ranging from the elementary to the university level.

CATTS conducts research on teaching and learning through directed programs designed for quality teaching practices and assessment, development of resource materials, and support of teaching environments.

CATTS develops and disseminates educational materials through consortium work involving participants from states/provinces through local educational agencies or groups. Consortium participants receive quality products and services specific to their local and professional development needs.

CATTS promotes partnerships with agencies, organizations, and other associations to advance technological studies in order to achieve common goals for developing technological literacy and improving student achievement.

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The Challenges

Fred Nastvogel

Educational enterprise is ever underestimated and too commonly criticized. Yet it persists, as either the centerpiece of life or the last place one was before chancing passage to adulthood. Memories of it bubble with the gurgle of youth's longing and hoping, curiosity, triviality, and unabashed fascination with self.

That's half the picture. The other part of education evolves each year from the tsunami of ideal filled teacher troops new to the classroom. There can be no other profession so numerous and filled with the belief that people- the little ones- are filled with promise. This faith may thin, but only in the way that gold can be pounded into quite a thin surface and still be gold.

Amidst this, technology teachers cause the youth to spawn things. Early on, Technology Education treats knowledge as a pillar of result.

Facility with tools and materials underpins Technology Education's greater mission to enable young people in *Problem Solving!* It's the link between idea and result that opens the door to the joys of creative enterprise. Kids and technology teachers alike thrive on this formula for learning.

The chairs are small and the lettering on everything large. There are no sharp edges. It's a space for children going about the business of being almost perfect; it's a school. Upon the walls are hung posters, with standard teacher stencil styling. They read, "Technology Weeks Start Monday."

For two weeks, elementary schools embrace hands-on challenge. First grade little fingers make bridges. Another grade makes the elevators that make tall buildings useful. Fifth graders read a book and make an amusement park ride. Throughout the school, children evince evidence of the technologies *behind* history and literature.

Across the plaza at the middle school, the technology teacher makes colored chalk entries in the permanent Problem Solving chart. The steps are *similar* to the Scientific Method. They are comparable to the age-old procedure for writing an essay. In each of these disciplines, one starts with a glimmer and hop scotches through increasing specificity to an outcome. But there is a distinction. Science gives you answers to how the universe works.

Technology uses that information and does something with it. The nature of this system is that if a young person can think it, he/she can make it. Once constructed, it is tested and changes are made.

The tools are all away and the students swept the floor before they left. The shelves are a Japetto's shop of adolescent inquiry. Officially, his workday is done; but before puttering down the road, he bobs over to lend a hand with Technology Weeks. This would be role modeling of teamwork, a mainstay in Technology Education.

Nights, there's "Techklatch." Technology teachers have taken to e-mailing strategy back and forth across the county. Their list-serve thrives. Sometimes the content is projects, others it's a swap meet for classroom materials. Each day, several times, Technology Education teachers set up learning banquets.

In the recent months, the chats have been about the Challenges. This would be the sixth year for them. The event has grown some in each. For the explorations of Technology Weeks, the Challenges are the exclamation point. They are the Olympics for the middle school Japetto shelves. They are the Expo for scores of high school solutions safaris. Students come as much to show what they have created as to vie.

The coming together starts after hours on a Friday at a new high school in the center of the county. Over the cobblestones of the school's clerestoried "Main Street," a few teachers rattle cafeteria tables into place for registration. They're enthused.

In the morning, *it's on!* They arrive, hundreds of them: students, parents, teachers, volunteer judges, and a smattering of the community's curious. Some areas feature displays in the vein of a science fair. Around them are the setups for other events: tracks and ramps, and cones with wires and tethering. Student designed airplanes loft their test loads. Students' handmade cars negotiate obstacles. The architectural displays are upstairs. Everywhere young people cradle and tweak things they have made, thumb one final time through their reports, replete with all manner of computer skills use.

"Well, I am Melissa and this is Jessimine... And this is our project."

Her stature is slight and perfectly vertical, including her hair, which falls directly to her shoulders. Her partner's hair is as a brown thatched halo about a round face with the dazzlingly hazel eyes. They stand close to each other, as if it were the most natural thing in the world.

"The book we read was _____ by _____."

"A troop of elves gets lost in a garden and need a way to get back home. So we made a ride that takes them... "
"... They get into these little plastic pieces...
"... They're bottle caps..."
"... and then it goes around from one side of the garden to the other."

Jessimine throws the little switch; tiny clay figures lurch forward, each with meticulously inscribed smiles. They trundle along on a twain cable, through towering colorful images of flowers cut from tissue boxes. Explication continues.

"At first the rubber band kept coming off, so we asked Melissa's mom and she said, 'Try moving the motor.' That helped, but we still changed the rubber band."

"And the pictures?"
"Kid Sketch. Computer at school. My idea."

Orals over, the fifth grade twosome steps back, leaving the judges to confer. In reference to the cardboard model with ancient Tinker Toy accents: "It's simply a nice piece of design. The scale progresses and they developed materials imaginatively."

"... In good taste."
"Plus *it works!*"

The kids were entirely giddy about the performance of their handmade vehicles. They circulated hurriedly between the top of the plywood ramp, where the cars were released, and the end of the marked-off space on the floor. The mom and son were having heated tête-à-tête, with someone who seemed to be a sister butting in. They pointed at the car, spun the wheels; maybe they cast a comparative glance at the next competitor's car's great paint job. Then, over against the wall, a little girl, one barrette missing, sat daydreaming in a chair, her car with a little figure in it upon her lap, and a certificate of participation in her left hand. They carry their projects about with the care usually accorded new puppy dogs and kitty cats.

By middle school, Technology Education fame is possible. Students get known for the projects they did in previous years. Results of a given Biology lab or trick Calculus problem or essay question in literature are pretty much the same from one year to the next. With Technology Education challenges, the quality escalates.

The racecars powered by CO_2 cartridges were pretty much-sanded blocks of wood with plastic wheels when the exercise was introduced. With the years, the level of competition has mounted. The cars are cut and sanded to the limits of the wood's strength. The finishes are astounding.

The same would be said of the magnetic levitation race. At the onset, the vehicles were chiseled Styrofoam. Now we see titanium rail jobs, canted to counteract torque.

Some of this is the natural evolution. Creative possession of outcome, and attendant competition, amplify the process. Collaboration between teachers from different departments helps too. This year, a lot of the CO_2 cars were influenced by teachers joint venturing with the Art Department.

At some time in school, most students will have had science experiments with magnets. They learn about the poles and the immense and immediate power of magnetic response. At such a point, science labs reach an answer and end. This is where Technology Education picks up with the making of motors and magnetic levitation cars. In this, Technology Education significantly increases the theatre in which knowledge of magnetism has an audience.

Within this realm, individual students can distinguish themselves and be remembered from year to year. Because Technology Education teachers talk, good showings take on a life of their own, whether the student is a Technology Education savant or destined for engineering. It's another dimension of teaching reaching its mark.

Hands down, theirs was the best Tug-O-War entry. It met the weight requirements. It locomoted. It had the requisite housing.

"No. No. Don't you remember? That's when we changed the weapon part."

"OK. OK. You're right," said the second presenter, turning back to the judges. "When we started out everybody was adding hammers to win by smashing the other guy...."

"... But that uses up the batteries. So we said, 'What's another way to stop the competition?'" resumed the first.

A judge asked, "So you knew another way of doing the project?"

"No. We had to find out about it!"

"After about a week we figured out what would work best was one of those gooey pads for catching rodents. It was the lightest way we could find to gum up the other tractor."

Tug-O-War's have come a long way since neighboring farmers first engaged draught animals in showdowns of brawn. It's become nearly litigious. Before designing a stitch, high school challenge takers scour over the rules, looking for the loophole through which to drive an advantage. You might call it the logic of the concrete.

The third team member stood motionless, holding a basketball with Macadam grit in its myriad recesses. He bounced it not once. His overstuffed attaché lay at his feet.

"We knew the principles. The limitation on batteries made energy finite. No matter how big the other tractor's attack device, it's useless if the vehicle can't move. Movement takes place at the wheels. So that's what we jammed up."

The first interjected, "We tested the tar patch on stronger and stronger wheels..."

The fourth finally vacated studied silence. She wore, of all things, a business suit. Following interviews, she'd taken it from the suitcase and pressed it. She bore striking resemblance to her dad, who beamed, if with reserve, from the second row of onlookers.

"We had a general understanding of the behavior of these assemblies. To become more exact, we built a testing device." Number two pointed. The coed continued. "With this information, we diagrammed several possible-hypothetical-arrangements."

Picking up the thread, the athlete spoke. "We had to balance a few different factors. For instance, the larger the sticky pad, the more energy we had to put into maneuvering."

"We threw out the least likely solutions, and used trial and error on the remaining three," she summed. "Our teacher calls it, 'Real World Design,'" chimed the first two.

The two underclassmen stood like sentinels aside their team's display. As the judges asked a few more questions, they whirred once more. All things considered, it was a handsome entry.

The movie theatre is starting to fill up. There are long lines at the home improvement store. The first batch of soccer games is coming to closure. And the cafeteria adjacent to the Technology Challenges is full, front to rear, for the awards. This part of the day, too, has gotten better each year.

Through the day, digital photos were taken. There was planning, so a laptop was brought along. The slide show was formatted the week before. As the appointed time nears, slide after slide of slick entries and smiling persons tick by over the table filled with trophies and certificates. The ceremony happens, winding its natural course through accolades and adieus.

Then there is a spontaneous move to restore the cafeteria's lunchtime order; the event is done. Little people in packs with parents and projects are parting.

The jumble on the parking lot clears with dispatch. Tops of trophies can be seen through some car windows. Or not. In the back of one van, three buds are sunken between a half pair of soccer shoes and an upturned trail bike. Most of the way home the rear view mirror frames them as sulking Musketeers. Then they are silent. Maybe they are sleeping off the defeat, Taxi Mom ponders. But no. When she slings back the side door, it's as if the curtain has been drawn on a marvelous new play. They are all three busy sketching next year's entry.

Fred Nastvogel is a technology teacher at Baltimore Polytechnic Institute in Baltimore.

ITEA Conference Update

The 64th Annual Conference of the International Technology Education Association will be held in **Columbus, Ohio from March 14-16, 2002**. The theme for the conference is "*Positioning Technological Literacy in the Mainstream of Education.*" Locations and themes for upcoming ITEA conferences are listed below. Note that the 2006 event will be held in Baltimore, Maryland.

2002	Columbus, OH *Positioning Technological Literacy in the Mainstream of Education*	March 14-16
2003	Nashville, TN *Advancing Information and Knowledge Through Innovation*	March 13-15
2004	Albuquerque, NM *Teaching Decision-Making in a Technological World*	March 18-20
2005	Kansas City, MO	April 3-5
2006	Baltimore, MD	March 24-26

A China Adventure

Leon Copeland and Bob Gray had the honor of presenting details of the Technology Education Leadership Project (TELP) to attendees at the 2001 China-US Conference on Education held in Beijing, China. The four-day event brought together over 160 teacher educators from the two nations to address the following topics:

I. Leadership and Systemic Change
II. Student Centered Instruction
III. Curriculum Reform
IV. Technology in Education

Leon Copeland's presentation, *Developing Maryland's Technology Education Leaders for the 21st Century*, highlighted the achievements of TELP and the planning and delivery of professional development that results in systemic change.

Bob Gray presented on the *Unique and Innovative Aspects of the Technology Education Leadership Project* including: 1) instruction based on the core technologies, 2) the utilization of six teaching/learning strategies emphasizing student problem solving, and 3) the development of facilitative leadership skills for professional development.

Chinese participants exhibited a sincere desire to learn more about educational reform in the United States and an interest in the open-ended problem solving activities characteristic of American technology education. They were particularly interested in our description of the Maryland Engineering Challenges.

The American delegation was impressed by the Chinese presentations on continuing education for primary and secondary teachers. Of special interest were presentations on action research being conducted by classroom teachers in China. It was evident that they viewed this activity as a normal responsibility of teachers.

Keynote speakers included:

Professor Gu Mingyuan, President, College of Education Administration, Beijing Normal University on "Education for All in a Learning Society"

Dr. Mary Beth Sussman, Chief Executive Officer, Kentucky Commonwealth Virtual University on "An Orbital Shift in Higher Education"

Dr. Lao Kaisheng, Professor, Beijing Normal University on "The Function and Reform of School"

Dr. Sam Stringfield, Principle Research Scientist, Johns Hopkins University Center for Social Organization of Schools on "Achieving World-Class Schooling for All Students in the 21st Century"

The U.S. delegation observed Chinese high school students in a chemistry laboratory. They completed three experiments in a forty-five minute period while their teacher observed and asked questions. Student responses to questions were uniformly accurate and complete. Of interest to us was the fact that students did not ask questions during the laboratory period only the teacher. After the class, we had an opportunity to visit with the chemistry teachers of the school and ask them questions about the class we observed. They acknowledged that the structure of their lessons is very formal and does not encourage creativity and application of content in real-world situations. However, the Americans noted the high level of performance of the Chinese students in carrying out several rather complicated laboratory procedures.

In addition to attending the conference, the U. S. delegation visited a number of Beijing's historical landmarks including the Forbidden City, the Summer Palace, Tian'anmen Square, the Temple of Heaven, the Ming Tombs. The highlight of these excursions was a chance to climb the Great Wall. Although it was very hot, both Marylanders marveled at this extraordinary example of structural technology and spent some time contemplating the lives of those who built and manned the Wall.

TRACTOR PULL CHALLENGE

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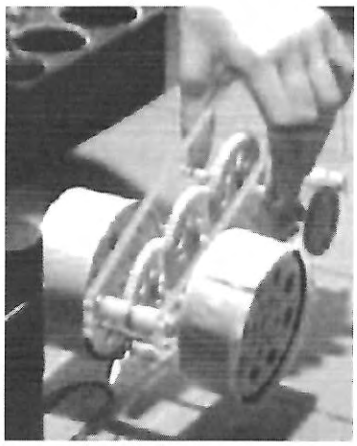

AGE/GRADE GROUP: Grades 9-12
TEAM SIZE: 2-3 students

CHALLENGE PROBLEM:
Design and construct a vehicle weighing less than 600 grams, powered by a 9 volt motor with an external power supply, that will pull a sled carrying the greatest amount of weight through a 6 inch long course.

I. WRITTEN REPORT AND DRAWINGS *Competition value: 30 points*

Follow the format provided in the Maryland Engineering Challenge "Guide to Entry."
Make sure that the body of your report addresses:

1. The science concepts that were considered in the design of the vehicle.
2. The changes made to the vehicle as testing proceeded. Explain the reasons behind each change.
3. The mechanical advantage of the power train employed in the vehicle.

II. ORAL REPORT *Competition value: 10 points*

A member or members of the team will present a 3 to 4 minute oral report that:

1. Describes the design and construction process used to develop the vehicle.
2. Explains the science concepts applied in the design of the vehicle.
3. Describes the changes that were made to the vehicle to improve its performance.

III. DESIGN AND FABRICATION *Competition value: 30 points*

The following specific construction guidelines must be followed:

1. The vehicle must use the Kelvin #850887 9VDC motor. [Motors will be supplied]
2. The vehicle must be designed to operate on an external power supply (provided by the judges for the competition) of not more than 9 volts DC.
3. The vehicle must not exceed these dimensions before, during, and after testing:
   9" Length 5" Width 600 grams weight
4. Gears, pulleys, belts, chains, fasteners, axles, and wheels may be constructed by the student or obtained from any source (*e.g.* Legos or Kinex).
5. The frame and all other parts not mentioned above must be constructed by the students and may not come from kits.
6. Adhesives or fasteners of any kind may not be used to increase traction between the tractor and the testing surface.
7. The vehicle should be finished to be aesthetically pleasing.

IV. PERFORMANCE DEMONSTRATION *Competition value: 30 points*

1. Vehicles are required to drag loads using the organizers' sled, from a standing start, over a 6" course, on the rough side of tempered hardboard.
2. Each attempt at pulling a weight will be limited to 1 minute.
3. The initial load will normally be 750 grams:
   Vehicles which succeed at the initial weight will attempt increasing loads until all but the winner has been eliminated.

The Performance Demonstration for this Challenge will be held on Monday, February 18, 2002 at the Garrett-Jacobs Mansion, headquarters for the Engineering Society of Baltimore, 11 W. Mount Vernon Place, between Cathedral & Charles Streets

For details of the sled and testing apparatus or other questions: contact Mr. Rick Avondet at (703) 360-0629 or email: gordy@erols.com

Technology Education Association of Maryland Excellence in Education Program

Each year the Technology Education Association of Maryland (TEAM) recognizes teachers and programs for excellence in Technology Education. These awards are given to educators at all levels of education from elementary to post-secondary education.

Our 2000 awards program was a tremendous success, bringing together over 200 individuals from education, business, industry, and local and state government. This year's awards will be presented at TEAM's Awards Banquet to be held at the Engineering Society of Baltimore on Thursday, October 18, 2001.

Boeing Supports Maryland Technology Educators

The Boeing Company is a Charter Sponsor of the Technology Education Association of Maryland's Excellence in Education Program. Boeing is a committed and long-standing supporter of education institutions and programs. Their involvement covers a wide range of activities as well as financial support. The largest single block of company contributions goes to education, including K-12 and college and university programs across the nation and in the countries where Boeing has operations.

In addition to school support, Boeing is committed to a performance-based educational system and is involved in initiatives at local, state and national levels. The company contributes to educational reform through corporate and personal leadership and financial support.

TEAM welcomes Boeing as a partner in recognizing the achievements of Maryland's technology educators.

Future Technology Teachers

ITEA is pleased to announce the availability of a new publication titled, ***Future Technology Teachers***. The publication is an instructional materials package that encourages high school students to consider technology education as a career. These instructional materials provide a challenging and enjoyable way for students to try teaching for themselves, and the materials encourage students to investigate technology teacher education programs in which they may enroll after graduating from high school. The publication was developed by the Future Technology Teachers Project at North Carolina A&T University in Greensboro, North Carolina. *Future Technology Teachers* was conceptualized, written, and field tested by a team of North Carolina technology education teachers, professors, and supervisors. ITEA Members: $10.00/ Non-Members $12.00. For 50+ copies - ITEA Members: $7.00/ Non-Members $10.00. Call (703)860-2100 or email iteapubs@iris.org for more information.

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TELP 2001 Summer Institute

Twenty-two Maryland technology educators participated in a four-day summer institute at the University of Maryland Eastern Shore in June. The purpose of the institute was to begin the process of aligning *Maryland's Curricular Framework for Technology Education* with the new national standards and to plan for the implementation of standards-based curriculum.

Taking advantage of the beautiful UMES campus, participants combined the renewal of acquaintances and recreation with some serious brainstorming regarding the future of Technology Education in Maryland. To stimulate creative thinking and broaden the participants' knowledge base, the TELP Summer 2001 Institute featured three outstanding guest speakers.

The "kick-off" speaker was Dr. Brigitte Valesey, Director of the Center to Advance the Teaching of Technology and Science (CATTS). Brigitte, a former Maryland technology educator, shared her insights regarding the implementation of standards-based curriculum. Her work with the CATTS project has developed into a strong consortium of states cooperating in the development of excellent curricular documents and the delivery of highly effective professional development activities.

The second guest speaker was Mr. Gary Heath, Chief, Arts and Sciences Branch of the Maryland State Department of Education. Gary's expertise in the intricacies of the Maryland Student Performance Assessment Program (MSPAP) provided guidance for the TELP group in planning and implementing Technology Education activities that support the overall academic achievement of all students.

The third speaker was Dr. Ron Todd of the College of New Jersey who described how Design and Engineering can be used to integrate and deliver science, mathematics and technology instruction.

Institute participants worked in small groups on three topics related to the updating of the *Maryland Curricular Framework*:

1) Integrating Maryland's Core Learning Goals,
2) Enhancing references to the Core Technologies, and
3) Integrating the Standards for Technological Literacy.

In conjunction with these sessions, Mark Kaniski of Washington County, presented some excellent suggestions on "Making the Most of the MSPAP Connections."

After focusing on the updating of the *Maryland Curricular Framework for Technology Education*, the group moved to the topic of implementing standards-based curriculum. Topics for discussion included 1) The Development and Selection of Standards-Based Curriculum, 2) Curriculum Delivery, and 3) Standards-Based Assessment.

It was the consensus of the group that Maryland should move forward rapidly on the two initiatives addressed in this institute. Dr. Leon Copeland, Co-Director of TELP, assured the participants that he would move ahead aggressively to obtain the resources needed to continue. MSDE participants Ms. Marquita Friday and Dr. Laura Spada pledged their support to the initiatives.

To facilitate some of the activities envisioned by the group, Maryland will consider joining ITEA'S CATTS Consortium described on page 23 of this issue.

Participating in the institute were:

Rick Avondet	Prince George's County
Joseph Baker	St. Mary's County
Leon Copeland, Sr.	UMES
Gerald Day	UMES
Joseph Depto	Dorchester County
Nikola Drobac	Garrett County
Samuel Ellis	Wicomico County
Marquita Friday	MSDE
Lori Fritzsche	Baltimore County
Bob Gray	MCCTES
Mark Kaniski	Washington County
Patrick Lieb	Worcester County
Ross Metts	Allegany County
Douglas Pruett	Prince George's County
Christopher Putnam	Baltimore County
Larry Ryan	Worcester County
Dennis Soboleski	Howard County
Bernard Trittelli	Washington County
Carl Truxel	Baltimore County
Kevin Webster	Caroline County
Joseph Wilkinson	Baltimore City
Dan Wood	Howard County

AIAA Invites Technology Educators to Become Associates

Tom Milnes, of the Baltimore Section of the American Institute of Aeronautics and Astronautics, has invited all Maryland technology teachers to join AIAA as Educator Associates. In addition to receiving technical resources from AIAA, Educator Associates are eligible for grants that support K-12 Science, Mathematics, Engineering, and Technology.

To become an Educator Associate of AIAA complete the application on the facing page and fax it to AIAA headquarters in Reston, Virginia. There is no cost involved.

AIAA

EDUCATOR ASSOCIATE APPLICATION

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- ☐ B Computer Science
- ☐ C Environmental Science
- ☐ D Earth Science
- ☐ E Engineering Technology
- ☐ F General Science
- ☐ G Integrated Science
- ☐ H Life Science
- ☐ I Mathematics
- ☐ J Physical Science
- ☐ K Teacher Education
- ☐ L Other Related Science

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