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Bits and Pieces

FROM THE EDITOR

It's About Priority . . . and Staying Alive Professionally

University classrooms can be lonely places. The rigors of working with adult learners of wide age spans; of planning class sessions that are relevant, challenging, and even entertaining; and of handling the day-to-day stresses of a university culture can weigh us down, impeding the professional conversations that we may crave. Additionally, as much as we value time to immerse ourselves in professional journals and books, listen to stimulating guest lecturers, and reflect on our practice, the demands of our daily work often make those moments drop to a low place in our priorities.

Many of us chose a career in the academic arena because of the great deal of freedom it offers, allowing us to work purposefully and creatively. While many of us are facing more constraints set by outside circumstances such as budget cuts, we must guard against letting our circumstances control us by dictating our priorities. Once that happens, it is easy to lose our professional enthusiasm, energy, and motivation. We need to remind ourselves that the freedom we have to set our priorities is perhaps the greatest power we have. We owe it to ourselves to use this power, to use it consciously and wisely, if we want to realize our potential as professionals. Without such a conscious choice, it is difficult to stay professionally alive.

In the last issue of the *Journal of Industrial Teacher Education*, I encouraged you to make it a priority to submit an article to *JITE* for Volume 43 or to assist a new scholar in converting his or her dissertation into a research article. This current issue of *JITE* resulted from that challenge. Two of the three feature articles are parts of doctoral dissertations. All three pieces went through revisions and would not be here without the assistance of professionals who set a priority to mentor a new scholar through the publication process. The two "At Issue" pieces in this issue are written by doctoral students under the guidance of university professors who took the time to encourage and promote new scholarship in our profession.

Keeping with the theme of priorities, I would like to suggest that you consider attending the annual NAITTE events in Atlanta, Georgia this November/December. There are numerous reasons to make going to our national meetings a priority. The reasons may be as different as each of us. For example, I am eagerly anticipating mingling and musing with others who love their subject matter and students as I do. I have been pondering many questions this year and I am looking forward to networking with others in our profession who share my questions. I want to hear what fellow researchers and writers are thinking about currently. And I know that when we get together we will project change.

How do you choose your priorities? Have you set your own priorities on the basis of reflection about the kind of professional life you desire? Or have you let your work circumstances, others, or simply convenience determine how you spend your professional time? Choosing or not choosing priorities for yourself will influence the quality of your professional life. In reflecting on his own life, psychologist Carl Jung (1961) noted that the world will ask you who you are. And if you do not know, the world will tell you. Won't you make it a priority to join us at the NAITTE sessions in Atlanta? Your professional life will never be exactly the same!

In This Issue

This issue of *JITE* contains three feature articles by three new scholars. I would like to introduce the authors, as well as their articles. The first author, Lowell Berentsen, worked in Alaska for 23 years as a mechanic on airplanes and helicopters before joining the faculty as an assistant professor at Southern Illinois University in Carbondale, Illinois. Berentsen's conceptual piece examines the use of aviation concepts and projects as a vehicle for the instruction of core curricula in secondary education. He contends that the knowledge and skills students acquire through aviation-concept teaching is readily transferable to other fields and that the technology education teacher is well suited to transform this teaching concept into reality.

The second feature article is a qualitative study, which is one part of a mixed method dissertation produced by Antje Barabasch. Barabasch grew up in East Germany and completed a doctorate at Georgia State University. She was interested in looking at career and technical education in the United States through her "lens of the German system." Barabasch examined how technical students' career choices are related to their perceptions of risk and opportunity within that particular career. Her research provides suggestions for helping young adults make technical career decisions. Barabasch is currently a visiting scholar at the University of Bremen, Germany.

Next, Edward J. Lazaros and George E. Rogers examine teachers' perceptions of critical issues and problems in technology education, employing a quantitative research model. Lazaros and Rogers worked together to convert Lazaro's dissertation research into the current journal article. Lazaros, a new scholar, is currently an assistant professor at Ball State University in Muncie, Indiana.

Two "At Issue" pieces are featured in this issue, both focusing on assessment issues. The first is written by Jeffery Cooper, a doctoral student at Oklahoma State University in Stillwater, Oklahoma. This is the first piece he has submitted to a journal and he is an exceptionally enthusiastic new writer and scholar. Cooper's piece focuses on the issue of developing career and technical education students' higher level thinking abilities. He suggests that CTE teachers use journal writing as part of their curriculum to help students learn to analyze, synthesize, and evaluate information. He points out that these skills are needed to compete in today's workforce. He offers strategies and assignment ideas and discusses grading issues.

The second "At Issue" piece is written by Steve Rogers, a doctoral student at Purdue University in West Lafayette, Indiana. Although a new scholar, Rogers is not a new author to *JITE*. Rogers discusses and reflects on standardized testing and suggests that there should be state-wide assessment tests in technology education to show students, parents, teachers, and administrators that technology education is relevant in today's climate of accountability.

Following is the *Journal's* "Bits and Pieces" section which contains information for submitting articles to the *Journal* and how to become a member of NAITTE.

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Team Teaching with Academic Core Curricula Teachers: Using Aviation Concepts

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Beginning in the 1970s and throughout the 80s and 90s, schools were confronted with education reform initiatives that introduced many ideas. These included outcome-based education, which was followed in turn by performance-based education. However, problems developed along the way when some individual teachers inserted their own agendas and applied their own definitions to outcome-based and performance-based education (Towers, 1994; Manno, 1995; Schrag, 1995; Eakman, 1996). Standard definitions and methods were lost in the confusion and these programs became open to just about any "touchy-feely" notion that appealed to the individual teacher. Ponnuru wrote that outcome-based education "has little to do with raising academic standards. Instead, it replaces existing standards with vague, often psychotherapeutic goals. These new goals become the criteria for assessing students, teachers, and schools" (1994, p. 46). Much progress has been made in the past decade to clarify standards, but the conversations concerning reform and the debates about how reform should happen, continue.

Out of the ashes of failures, and especially as a result of the efforts of those who recognized the problems and worked to correct them, came programs such as School-to-Work and Career Pathways and the development of new courses in vocational high schools and tech-prep schools. "Shop" and vocational education programs began to take on a new appearance under the new name of technology education. Yet in spite of government intervention and the redefining of technology education, problems and misconceptions about our field persist. Some administrators and academic core curricula teachers still look down upon technology education and industrial arts courses as non-academic

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classes that serve only to fill the school time of those students who are not planning for a post-secondary education. Even from within the ranks of technology education, we continue the struggle for the "legitimization of technology education as a school subject," (Lewis, 2004). Students who are not excited about school are still falling through the cracks while the "brighter" students graduate from high school with theoretical knowledge, well-prepared for post-secondary education programs, but severely lacking in the ability to apply what they have learned to the everyday life experience of employment.

The solution to these difficulties lies within technology education itself. Technology education holds the potential for teaching all students the skills of problem solving, and technology education teachers should be emerging more and more as a vital part of the academic core teaching team.

Premise

Technology education teachers today have at their disposal the skills, opportunity, experience, ingenuity, expertise, equipment, and environment to greatly improve students' ability to learn and apply the knowledge they have gained in their academic programs. This paper is based on the following four propositions:

1. Technology education is the logical system for providing an effective performance-based education that prepares the student for his or her immediate future, whether it be a post secondary education institution or the job market.
2. Technology education teachers are the key to helping students make the connections between their academic core course material and the real world. Technology educators can accomplish much by aligning themselves with academic core teachers in a team-teaching environment, benefiting both the academic core and technology education programs.
3. Aviation concepts and projects can provide the catalyst and the vehicle by which students can discover the relevancy of their entire academic core curriculum. Even core curricula teachers who have had no aviation

education or training can incorporate aviation concepts to motivate students to learn academic core material.

4. By incorporating aviation concepts, students can grasp the importance of learning core subjects in high school and at the same time learn the empirical knowledge and skills that technology education offers for facing life in the real world.

Aviation training, like many critical professions, was an outcome-based education before outcome-based education became a philosophical idea. Many schools geared towards industry, particularly charter schools and magnet schools, have adopted educational materials with a focus on aviation. On January 8, 2002, President George W. Bush signed the "No Child Left Behind Act of 2001" (NLBA) into law. The new law represents the President's education reform plan and "contains the most sweeping changes to the Elementary and Secondary Education Act since it was enacted in 1965," according to the National Aeronautics and Space Administration (NASA, 2002, p. 5). Since President Bush signed the NLBA into law, aviation has begun to play an increasing role in K-12 education in the United States. Both NASA and the Federal Aviation Administration, along with several universities, have taken a proactive part in producing aviation related materials tailored to all grade levels. While most schools are not ready or cannot afford to make a drastic shift in their curriculum, technology education teachers may nonetheless work with academic teachers to link aviation concepts to their school's curriculum.

Team Teaching

Historically, teachers have operated in isolation when teaching their classes, acting as the sole disseminators of information the students must learn in order to pass their particular class (Heller, 1967; Buckley, 2000). For most high school students, their school day is divided into equal, seemingly unrelated time periods with no structure to assist them in making relevant connections between disparate courses. Some educators question the wisdom of this approach. The Northern Nevada Writing Project Teacher-Researcher Group wrote,

"Interdisciplinary classes help students see the relationships between disciplines, assuring that they make connections they would otherwise be left to make on their own" (1996, p. 7). When that interdisciplinary relationship is formed between academic core and technology education teachers, the combination packs a great potential for learning. When a technology education teacher joins forces with an academic core teacher, the students reap the benefit of gaining empirical knowledge and skills not usually acquired within the confines of the traditional teacher-centered classroom. By completing projects and design activities, routinely offered in the technology education lab, students engage in critical thinking and gain transferable and empirical knowledge and skills (Cotton, 2002; Helm & Beneke, 2003; Johnson & Chung, 1999). Furthermore, through the active learning strategies of the technology education classroom, the student is given more ownership of his or her own learning and may develop a greater desire to participate in the learning process. The students' motivation to learn can thus be transferred from an extrinsic source to an intrinsic source (Brewer & Burgess, 2005).

There are several models for structuring team teaching. Goetz (2000) lists six styles: traditional team teaching, parallel instruction, differentiated split class, monitoring teacher, collaborative teaching, and complimentary team teaching. The first four styles are similar in that they each share or divide responsibilities for teaching the same material to the same class during the same time period. The last two, collaborative teaching and complimentary teaching, follow a somewhat different format.

In collaborative teaching two teachers work together preparing for the same lesson but then deliver their material to the students in a two-way discussion forum. A possible drawback of the collaborative teaching approach is that it has the potential to confuse students if two teachers present differing viewpoints on a particular subject. On the other hand, exposing students to a variety of viewpoints may help them analyze information and encourage them to make their own informed decisions, rather than robotically swallow opinions and thought processes spoon-fed them by a teacher or from a textbook.

In complimentary team teaching, one teacher delivers the core material in his or her lecture class, and then the material is

followed-up by another teacher in another class, usually incorporating a different style of learning. One might think of this teaching method as relay or tag-team teaching. Of Goetz's six styles, complimentary team teaching provides the format most suitable for bringing technology education into the academic core curricula arena.

Complimentary team teaching can be an exciting and fruitful style of teaching for both the technology education and core curriculum teachers as well as for their students. It is not a teaching style that results in conflicting information from two different teachers, but, rather, when carefully orchestrated, provides a supportive, reinforcing, and encouraging learning environment for students. In complimentary team teaching, the academic core and technology education teacher work together as equals. In no sense does the technology teacher become a teacher's aid to the core teacher. Rather, each teacher reinforces what the other has taught. The core teacher provides the lecture, theory, and, together with the technology teacher, designs the student assignments. The technology education teacher provides the laboratory, skills, and expertise to assist the students in building working models for experiments and simulations that verify the theoretical results arrived at in the core lecture class. Simply put, the core teacher explains that $2 + 2 = 4$, and the technology education teacher shows the student how to successfully demonstrate that $2 + 2 = 4$. The teachers work as a team, moving toward the same conclusion, much as an engineer, a technologist, and a technician do in an industrial environment.

In complimentary team teaching, the theoretical may be introduced first and then applied in the laboratory; however, the reverse can accomplish the same purpose. Another approach is to first present the students with the challenge of a life-situation to solve, and then have them examine the theoretical side of the experience in an academic core class such as math, science, or physics. In this case the lesson begins in the technology education class and is followed up by lecture in the academic core classroom. For some students, particularly hands-on learners, this approach may be preferable.

Complimentary team teaching allows the teachers to appeal to many different learning styles. Students have more

than one chance to understand the material. They learn about a topic from two different teachers and in the technology laboratory, are free to apply a variety of learning styles as they work to complete the practical assignments.

Regardless of whether the theoretical learning precedes the applied learning or vice versa, the technology education class provides a learning lab for the academic core instruction. In the lab students learn skills in the use of tools, design, construction, and problem solving. Students immediately apply the theories presented in the core class to the related projects in the technology education class.

The model of complimentary team teaching can involve a variety of subject area combinations. In one case where complimentary team teaching has been practiced, mathematical concepts were introduced in a math class and then the math concepts were applied in a chemistry class (Goetz, 2000). Mulholland described how a team of teachers "developed team-teaching models that would enhance learning environments by integrating reading-, writing-, and math-skills development" (2005, p. 16). An unexpected team teaching arrangement was used to combine lessons in English and woodshop. After reading *The Diary of Anne Frank* in their language arts class, the students drew blueprints and then built models of an Amsterdam house—a project which also linked the lesson with their math standards (Mulholland, 2005). In his discussion about the inclusion of engineering design as content in secondary education, Lewis writes that an "option might be to adopt a collaborative approach to design, where technology teachers team with mathematics and science teachers, and with practicing engineers, in the teaching of design. This strategy would allow both analytic and conceptual aspects of design to be realized" (2005, p. 50).

Not all teachers may buy into this philosophy of team teaching. Some faculty members may not want to make changes from their routine. Some may recognize that they have mastered a successful method of teaching and find no advantage to altering it. They may prefer to stick with the tried and true. Heller (1967) offers a "note of warning:" "Not all teachers can be, nor want to be, team teachers. They are successful in their own right, and they are not convinced that a change is best for them. Perhaps

they are correct, and their wishes should be respected. If team teaching stresses individualization, it is ridiculous to contradict this emphasis by trying to force every teacher and student into its mold" (p. 13).

Team teaching initially requires some extra planning time. However, for those teachers who are interested in initiating team teaching in their schools, there are ways to begin with a minimum of disruption to established school schedules or existing lesson plans. For example, a technology teacher might pair up informally with a mathematics teacher and, by designing activities for the technology lab that connect to the math teacher's lesson topics, provide students with relevant applications of concepts covered in their mathematics class. Once such a cooperative relationship between teachers is established and flowing smoothly, other teachers as well as administrators may see that complimentary team teaching provides advantages both to students and teachers alike.

Using Aviation Concepts

Many areas of technology education can be successfully integrated with academic core subjects to serve as team teaching arenas. Building construction or automotive concepts would certainly serve well. So why use aviation? One reason is that teaching with aviation concepts captures the imaginations of children of all ages, and constructing aviation projects magnifies their interest and enthusiasm for learning. Magnet schools across the United States are experiencing success and growth using an aviation theme. In 2005 the Federal Aviation Administration conducted the seventh bi-annual National Aviation Magnet Schools Survey, which identified 67 aviation magnet school programs. Since 1985 the Magnet Schools of America Association has identified 71 different magnet themes, of which aviation and aerospace is one of the fastest growing themes (Federal Aviation Administration, 2005).

In addition to sparking student interest, aviation concepts serve as excellent sources of material for mastering the objectives listed by the Standards for Technological Literacy. Under "The Nature of Technology" standard 2 states, "Students will develop an understanding of the core concepts of technology"

(International Technology Education Association, 2000, p. 32). Aviation is an excellent vehicle for communicating the core concepts of technology: During the process of flight the aviator and machine must work as one with the aviator relying on appropriate and accurate feedback from the controls. In flight, an airplane's various systems must come together and make the necessary optimizations and appropriate trade-offs to fulfill the requirements of the physical laws that enable the plane to overcome the force of gravity.

Technology standard 3 states, "Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study" (ITEA, 2000, p. 44). Aviation provides a comprehensive and broad range of technologies that bring together various education disciplines. The most obvious disciplines related to aviation are math, science, and physics. However, safety in aviation depends upon the aviator also being proficient in speaking, reading, and writing skills. An aviator needs to be a good communicator. He or she must be a person of integrity who is dependable, ethical, and responsible.

Team Teaching with Math and Aviation

Uniting a technology education teacher with an academic core mathematics teacher and using aviation as a theme seems a logical place to start a complimentary team teaching partnership. Without math there would be no aviation and no space technology. Correspondingly, without aviation science, there are math concepts whose relevance might not yet be recognized. Many concepts proven through the experiments and empirical knowledge gained through the space program would still be merely theories in books had it not been for aviation science. Students can profit from investigating and understanding this dynamic interrelationship.

Many technology education teachers are familiar with the Wright Brothers Design Challenge kit available from KELVIN® (Kelvin, 2005). With these kits, students design and build Styrofoam airplanes out of ordinary Styrofoam food trays and specialty parts that can be purchased from KELVIN®. After

completing their models, students then put the airplanes to the ultimate test of flight.

Outlined below are some possible activities and experiments that can be done with the student-constructed Styrofoam airplane as its flight worthiness is tested. These activities explore and test both the mathematical as well as the physical concepts that govern flight. The projects provide practical applications for the theoretical knowledge students have gained in their math classes and confront the students with the real-world technological challenges of aviation.

One important consideration when designing an aircraft for flight is the effect of weight and balance on the airplane. A student can explore the consequences of different weight loads placed in different locations within the Styrofoam airplane by cutting a cabin area from the model's fuselage and placing weights at different longitudinal locations. While students may initially test their crafts resulting flight capabilities through trial and error, with the help of their math teacher, they can investigate mathematical methods for determining optimal weight distributions.

Even if the weight is located properly in the airplane, there is a maximum weight that an airplane can carry. If the force of lift does not exceed the force of the gravity on the weight, the airplane will not fly. Wing area and wing shape—along with the speed of the wing through the air, the angle of attack of the airflow, and the density of the air—are the five factors that affect lift. By making adjustments to their airplanes wings, the students can demonstrate the effects of simple wing changes on their airplanes' flight. Students can learn about the mathematical side of the coefficient of lift by accessing the NASA website, www.grc.nasa.gov/WWW/K-12/airplane/short.html.

In the process of testing their airplanes, students might begin to wonder "Do I have a motor powerful enough to pull this weight fast enough to fly?" "Is my propeller big enough?" "What will happen if I install a bigger motor or a bigger propeller on the plane?" By measuring the diameter of the propeller and determining the speed of the motor from the manufacturer's specifications, the students can compute mathematically just how fast the tips of the propeller are traveling. They can explore

mathematically how changes in propeller and motor size will alter the spin and speed of the propeller.

The third factor of lift, the speed of the wing through the air, also spawns an important question: "How fast does my airplane fly?" To explore the answer to this question, students can use empirical measurements taken in the technology laboratory and apply them in the mathematical formula for speed. The student can record the airplane's time in flight and measure its distance flown and then, knowing distance and time, use the mathematical relationship between distance, rate and time to determine how fast his or her airplane is flying. Students can experiment with alterations in their airplane models to see how speed is affected by changes in aircraft design.

Discussions of wing aspect ratio can assist students in recognizing the meaning and the significance of the lessons on ratios that they study in math class. Airplanes with two different wing designs, each having the same surface area but differing aspect ratios, require different air speeds to maintain flight. The technology teacher can guide the students in experiments that use two wing designs that differ in aspect ratio but that maintain the same surface area and cross sectional shape. Using the methods for determining airplane speed, the students can explore the minimum speed requirements that airplanes with different wing aspect ratios require to remain aloft or airborne.

During the course of these experiments there is a very real possibility that some airplanes may crash and need repairs. A few crashes will provide concrete motivation for students to get the numbers correct in the math class, or it's back to the "drawing board" in the technology lab.

Conclusions and Implications

Lewis acknowledges that when students compete in engineering contests to build the longest or strongest bridge or to construct the highest tower "often the teaching episode ends when the winner is identified, without students gaining understanding of the reasons behind the success or failure of their attempts" (2005, p. 50). In industry, the structural testing and resulting failure of products is called "destructive testing," meaning the product is of no more use for further testing other than analyzing

the points of failure. However, the Styrofoam airplanes' tests described above and the aircrafts' performances in the various suggested experiments are in a sense "non-destructive" testing. With correct mathematical computations, each test can be completed without destroying a student's model. The "non-destructive" testing permits a student to experiment further and to continue to learn using the same self-constructed learning platform – the airplane. The empirical knowledge gained through the Styrofoam aircraft design activity can increase students' understanding of the relevance of mathematics, improve students' problem solving ability, and enhance the students' learning environment.

Standard 9 of the *Standards for Technological Literacy* focuses on the understanding of engineering design. "One of the final steps in the engineering design process is to build or construct the actual product or system in order to determine if it works" (International Technology Education Association, 2000, p. 99). This is an equally important final step in the learning process of high school students but is one which is often disregarded or over-looked and omitted in academic core classes. Successful pragmatic outcomes should complete and underscore the abstract theoretical facts the students have mastered in their academic core classes. With a technology education teacher team teaching with an academic core class teacher, the learning experience can include this final, all-important, hands-on step that completes the study topic and brings it to a logical conclusion.

Aviation is a subject which seems to appeal to girls and boys of all ages. One evening, while flipping through television channels, I happened to stop on a program in which children were individually being asked the question, "What do you think heaven will be like?" Each was asked the question privately; each without knowing how another child responded. One girl replied that the flowers would never die and would always smell wonderful. A boy imagined out loud that there would be lots of animals and he would be able to ride the elephants and tigers. Another boy was content with just riding horses all the time. Most had different answers; girls responding with "typical girl answers" and boys giving "typical boy answers" – except in one

area. Only one picture of heaven was imagined by several of the children—boys and girls alike: "We'll be able to *fly* all over."

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No Worries about the Future: Young Adults' Perceptions of Risk and Opportunity While Attending Technical College

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In our ever-changing economy, young adults must remain flexible and adaptable as they transition from school to work and plan their future life courses. It is difficult for today's youth to choose training programs which will guarantee them secure, long-term employment. As the future grows less predictable, greater uncertainty and risk are involved in each career decision.

This study concerns young adults enrolled in vocational education and training programs. The study sought to investigate the complex relationship between macro-structure influences such as social policy and job-market opportunities; micro-structure pressures, which include such things as family obligations, peer influences, and personal goals; and an individual's perception of risk and opportunity as he or she plans for the future and makes the transition from school to work.

Today, young adults must make career choices in life without being able to predict the future labor market. They must be able to reflect on their choices, assess their self-development, and evaluate their opportunities in regard to employment. To do so, young people must acquire skills and knowledge in formal training programs. Personal beliefs about values, social institutions, and moral behavior will also guide them in their decision processes. Risks, therefore, are embraced or avoided based on a complex interplay of personal, cultural, moral, and social standards.

The current study drew on individuals' narratives describing their future goals and life plans. In addition to questionnaires, information was gathered through focus groups

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and biographical interviews which were conducted with students enrolled in technical college training programs in a major city in the southeastern United States. From analyses of the young adults narratives and statements concerning their life and career plans, the researcher sought to determine how the students perceived risk and opportunities concerning their professional futures. The researcher also investigated the strategies, attitudes, beliefs, or behaviors the students employed to cope with risks and to enhance opportunities. Through personal interviews and focus groups the researcher explored to what extent the young adults in the study were aware of the various influences affecting their choices of careers and what promises or limitations they perceived these influences held over their futures.

Perceptions of Risk

The life course of young people today does not necessarily follow the traditional model of graduating from high school, completing professional training, obtaining a job, and building a family. Heinz (1997) outlined that today's life-course is increasingly dependent on vicissitudes in the labor market, which may lead to unexpected conflicts and risks. As a consequence, the individual has to be creative and innovative in order to compensate for uncertainties and change.

Ulrich Beck (1986, 1992) and Anthony Giddens (1990) wrote that the individual has become an active negotiator who either takes or avoids risks when there is uncertainty as to what the future may bring. According to Beck (1992)

> In the individualized society the individual must therefore learn, on pain of permanent disadvantage, to conceive of himself or herself as the center of action, as the planning office with respect to his/her own biography, abilities, orientations, relationships and so on. (p. 135)

Douglas (1978, 1992) proposed that a person's perception of risk is determined by his or her prior commitments to different types of social solidarity (Wilkinson, 2001). According to Douglas and Wildawsky (1982), risk perceptions are embedded within cultural meanings and exhibit a wide variability.

Risk is socially constructed and historically conceptualized (Lupton, 1999) and may differ between youth with

different social backgrounds or schooling. However, according to Renn (1998), risk is perceived as a multidimensional phenomenon that involves beliefs with respect to the nature of the risk, the cause of the risk, the associated benefits, and the circumstances of risk-taking. According to Douglas and Wildawsky (1982), a leading question in the analysis of cultural differences in risk perceptions is "Why do people emphasize some risk while ignoring others?"

In general, Americans believe strongly in individual choice (Furstenberg, 2003) and hold to the premise that everyone has equal opportunity and is free to rise above his or her social class (Hochschild, 1981). In the United States, institutional stratification is delayed and individuals get second and third chances should stumbling blocks occur along their paths through life. At the same time knowledge and networks are unequally distributed and opportunities might therefore not be practically accessible for every American (Cook and Furstenberg, 2002). Furlong and Cartmel (1997) agreed that the poorer part of society has to carry the biggest burden of uncertainty and risk.

The transition into adulthood has become more individualized (Buchmann, 1989) and disorderly (Rindfuss, Swicegood and Rosenfeld, 1987). Youth have an extended moratorium (Arnett, 2000) that enables them to explore several life options before committing to one. On one hand investigating a variety of alternatives might lead young adults to greater maturity and increase the likelihood of their making informed occupational choices and eventually achieving fulfillment in adult work and family roles. However, extended periods of floundering may also involve financial investments with no assurance of reimbursement through future jobs.

Research Questions

The following research questions guided the data collection and analysis in this study:

- How do young adults in a technical college in a major city in the southeastern United States perceive risk and opportunity regarding their future life planning?
- How do young adults in a technical college in a major city in the southeastern United States cope with uncertainty

regarding the continuously changing requirements of the labor market?

- How do their underlying values guide young adults in a technical college in a major city in the southeastern United States in their planning for their futures?

Methodology and Methods

This study followed the life-course approach from Bremen (Marshall and Mueller, 2003). The Bremen school uses case studies to explore how people construct meaning in, and make sense of, their life courses. Through case studies, it analyzes the interplay of institutions and social policy to determine how these systems regulate the timing and sequencing of an individual's life course

The qualitative data for this study were collected through focus groups and individual interviews. Study participants also completed questionnaires. Additionally, in the course of the data analysis, the literature aided the search for explanations and interpretations.

The study subjects were drawn from students enrolled at a technical college in Atlanta, Georgia. The technical college provides training in various vocational fields. The fact that the subjects volunteered to participate in the study led to data collection by means of a convenience sample. Between November 2005 and February 2006, students enrolled in four technical programs (Drafting, Office Clerk, Accounting, and Plumbing for Heating and Air Conditioning) participated in this study. In total, 64 students filled out the questionnaires. Because the students' class schedules were arranged to fit their individual needs, and students did not necessarily attend all their classes with the same group of peers. The study participants were also at different stages in their progress through their programs of study.

Some of the students who filled out the questionnaires also agreed to participate in focus groups and individual interviews. The purpose of the focus groups and biographical interviews was to learn more about the students' future life and career plans and to what extent risk perception played a role in these plans. In addition, the focus groups and individual interviews gathered data to uncover the interrelationship

between the different institutions—such as family, school, apprenticeships, social programs, and government policies—that influenced a student's life. The analysis of the narratives sought to identify cultural patterns such as shared beliefs, attitudes, norms, roles, and values that shaped the students' decisions and choices.

Findings

Demographic Data

Sixty-four technology education students completed questionnaires. The students who filled out the questionnaires ranged in age from 17 to 50 years, with an average age of 28. Males and females were distributed fairly equally among the study participants. Thirty-four males and 30 females completed the questionnaires. The study subjects consisted of 11 Whites, 47 African Americans, three Hispanics, one Asian, and three Africans (Eritrea, Ethiopia).

A respondent's socioeconomic status was categorized by comparing it to the average monthly household income in Georgia which is $3,600 (Gale, 2005). Eighteen students stated that their family income was below the average amount in Georgia, 15 reported family income of around the average amount, and 15 indicated their family income was more than the Georgia average, while 16 of the participants did not complete that item in the questionnaire.

The exact occupational and educational background of the respondents' parents was impossible to determine because very few students filled in that item on the questionnaires. Many of those that did, simply named an employer but did not describe a profession. Nevertheless, the data revealed that the majority of the students had parents with working class backgrounds, which is typical of students who pursue vocational training (Shavit and Müller, 2000).

The majority of the students worked in low-skilled jobs for some time before entering the program and most continued to be employed while enrolled in the technical school. Almost all the students had some work experience. Two students helped out in a company owned by their parents. Others had found jobs on their own, and some had changed jobs several times. Only a few

students worked in a field that was related to their technical program, while the majority was employed in a wide variety of jobs.

Motivations, Problems, and Goals

To learn more about the young adults' choices and how their choices related to their perceptions of risk and opportunity, the questionnaire contained a number of items concerned with individual reasons for enrolling in the technical college as well as items eliciting the students future plans. In response to "Is the program you are currently in the program of your choice?" Fifty-nine students said "yes" while four said "no," which indicates that a large majority entered the training program as a conscious, self directed choice.

For most of the students, the main motivations for enrolling in the technical college were job security, independence, and higher paychecks. These comments were typical of many study participants:

> Luis (22): After I have this degree the job market is open. If I lose my job somewhere I can easily get another job.
>
> Marcus (25): I chose it because of the future and stability. I don't have to worry about that they close my company and I would be out of work. There will always be work available in this field. You can also work for yourself. You don't have to worry about money. You can be independent.
>
> Lucius (29): I chose this job because I got tired of people who take over your job or something. With this job you got a degree and that protects you more. In many jobs they can just hire anybody from the street. I used to work in a job where I needed to read barcodes and so. Everybody can do that.

Another student explained that he wanted to develop his skills to the best of his abilities. He felt he needed to be in an artistic profession, although he was not sure if the program he was in (heating and air conditioning, which had a drafting component) was the right one. But, after trying and abandoning welding, he believed that he was now getting closer to it. He also

valued developing "troubleshooting skills." Heating and air conditioning, he explained, is not just a job. It is a multitask profession with skills that can be applied in many different areas.

> Alex (27): It is also essential in troubleshooting where you learn how each component works with the other components. That assists you in troubleshooting and how something works. So, that is also a field where one learns how to think in that manner. Once you have learned it you can name and address problems in the other fields too.

Lucius described the neighborhood he lived in as one where a lot of people were unemployed and involved in crime. He had three children by three different women and kept in contact with all of them. Lucius had moved out of one crime-ridden neighborhood and planned to move again once he was employed. At the time of the interview he was taking care of the household while his wife, who was expecting a child, worked full time. He explained that his desire to avoid entanglement in drugs and crime were his main reason for enrolling in the technical education program.

> Lucius (29): It keeps you off the street. In my neighborhood there are many who don't work, taking drugs and getting involved in all kinds of criminal activities. I didn't want to end up there. That's why I chose to get more education.

In general the study participants chose to enroll in a technical program mainly to gain higher paychecks and secure greater job security. They did not perceive their choice as one that would direct the course of their lives. Some students viewed their technical training as a foundation which would allow them to move into a variety of other professions.

Floundering, or switching from job to job and from job to school, as well as the difficulties of juggling jobs, school, and family were among the difficulties and risks that arose in the discussions. For most of the students surveyed it was rare to have gone straight into technical college after graduation from high school. At 28, the average age of the students who participated in the study was well above standard freshman age. The students' reasons for not enrolling in a technical college straight away were

many and varied. Some students wanted to earn money or needed to save up in order to be able to afford schooling. Others did not like school or needed a break from it. Some who had been uncertain about which field of training to start had not wanted to waste time and money by enrolling in programs they might later find unsuitable. Caring for a household and children, dealing with a difficult family situation, or having a spouse that discouraged them from going to school were other reasons respondents cited for delay.

In the interviews and focus groups, the students revealed other problems and difficulties they faced while attending school. Some of the respondents held two or even three jobs at the same time and worked up to 70 hours a week. They explained how they managed their lives under those circumstances. Michael, in addition to working and attending classes, also had a family to take care of and friendships he wished to maintain.

> Michael (26): I am the storage media operator, basically a librarian in a big library. Get tapes, I mean get the books and put them back where they belong again. Check books out and check them in again. That's basically what I do, except there are no books it's A-Tapes. Then Max Living, you know it's a home improvement company. I am a cashier there. I am starting my career helping out in a drafting office. The other two are just jobs. So, I pick my career over jobs… Right now I am doing 70 hours a week, I go to school and I am a father.

Michael reported that he was applying for a drafting job since he had almost completed his training program. He stated that if he found employment in his field, he planned to quit the other jobs. Many of the young adults in the study struggled to balance work and school. Some students could only find time to take one or two classes per semester, which delayed their graduation. Others worked early in the morning or late in the evening or had long distances to drive.

The individual interviews and focus groups also revealed that self-employment was the ultimate goal for many participants. Many viewed owning one's own business as an indicator of true success.

> Kevin (24): Having your own business is the way to make it. That is pretty much it. If you work for a man you never gonna make it. You gotta be the man.
>
> Michel (26): That's my thing. I tell people that I go to school now and get a degree and then get a company and owe it. I mean I don't mind working differently now, but I see myself in the future at least buying a company. That's one thing that I want to do. If you work for somebody you loose money.

The students believed that graduating from a technical college can, in some cases, be more lucrative than obtaining a bachelor degree. The students reported that the teachers in the technical college supported this idea and informed the students about possible future incomes in the fields they were studying. In the drafting program, for example, students reported that an instructor had told them that former graduates had been hired for yearly incomes of $52,000. Despite high income expectations the students were aware of their limitations.

> Kevin (24): There is a difference between just getting a degree out of college and getting a professional certificate. Financially, I will, on a long-term, not be able to make as much money as an architect, but we start out on the same level. That's the biggest thing for me—to make more money.

Another theme often mentioned by the study participants was retirement. Many students anticipated retiring sometime between 35 and 45 years of age. Further questioning revealed that many students understood retirement to be the point in life at which they discontinue outside employment. The students planned to work hard in a job until a certain age and then either start their own businesses or live partly from investment income and partly from income from other jobs or income opportunities. One study subject stated

> June (20): I want to be retired at least by the time I am 40. But, a lot of us would say we want to have our own business and that would increase the chances of retiring earlier. If I can retire before 40, if I become successful in what I do that would be

> great. I want to see lots of things. I want to be able to do whatever. I think there are no limitations. I don't see myself past 40 still working in the company where I am right now. Then I will have my own business. There are people who have their own business and become extremely successful in less than three years you know. They sometimes have only an education like us or even less.

Another study participant's life plan appeared to be drawn on the success of young television stars.

> Shenique (19): I want to start very young, probably 35 if I can; if I can. I mean I don't want to work all of my life. I mean, both of my grandparents have their own business and they are both staying home. They have people working for them. That's what I want to have. I want to have my own business and stay at home and still make money. Not being at the job. That's how I want to be. I am trying to be how I deserve it. See that I get a degree and see how far we want to go from there. Make quick money, so that my family can be straight. And my boyfriend kind of motivates me now. He says, you are young, you can be rich. And you see the people on TV and see how young he is I think if they can make it, I can do it to. I will retire very young.

While Shenique dreamed of early retirement, a student in the drafting group argued that one should be realistic about retirement and that most of the students should expect to work at last until reaching the statutory retirement age. Other students emphasized the importance and necessity of generating an income beyond age sixty.

> Jason (19): If you work on commission you work as much as you can. For commission you work 200%. I cannot imagine retiring. I will always do something. If I would retire, I would do something else
>
> Timothy (34): Americans are money driven. There is plenty of stuff people want to buy, SUVs, nice

> houses. Everybody wants to have it comfortable; so people work more to have more money.
>
> Jeremy (22): I think most people want to work as long as they can. And when they are in their fifties and seventies they figure they don't have enough money that they need and they work the whole time to make it through to their seventies. Some work very hard in their twenties and thirties to have more money later. My parents worked hard until they were in their sixties because they didn't have the money to retire.

Despite the hardships and obstacles many of the students faced, optimism and a sense of opportunity dominated the students' discussions about their life plans Adrian (19) pointed out, "There are no limitations in life and I want to do a lot of things." Kevin (24) stated simply, "The sky is the limit."

When asked, "How sure are you that you will find a job with your training program?" 33 of the students said they were "very sure" that they would find employment after their graduation, 21 were "sure," seven had no opinion, and only 3 of the students stated that they were "not sure at all." The three students who were not sure about their employment prospects were immigrant students who explained that they had been rejected at many places because their language skills were not sufficient or their English pronunciation was not clear.

None of the participants expressed serious concern about unemployment, but instead viewed their future employment prospects with optimism. Consequently, risk perception in this regard turned out to be very low. The students in the drafting group described how their teacher helped successful students find employment in the drafting field.

> Matthew (27): But they get you a job here. They don't have any unemployed graduate student that has already graduated. They said there is not one student that came through and studied with him who is unemployed. They are all working in drafting. It's a really good opportunity.

Students in the accounting program also explained how their instructor helped them establish contacts with the various

businesses where they might find employment such as the banking or the insurance industry. Accounting students reported that the technical school supported them by offering free retraining for those accounting students who did encounter serious employment difficulties. The situation in the heating and air conditioning program was similar. Students studying heating and air conditioning stated that they believed that there were many jobs available and thought they would definitely find something in their field. The results of the interviews indicated that there was strong optimism among the study participants concerning their future employment opportunities and their overall chances for success in life.

To help determine the young adults' perceptions of future opportunities, the students also answered the question, "Would you like to go in another program after this one?" The results showed that 23 students planned to start another program directly after completing the one they were currently enrolled in, while 13 stated they expected to do so in three to five years, and another 12 thought they would start another training program sometime in life. Ten of the students said that they were not interested in going back to school. The data generally supported the notion that many students believed in the importance of further schooling. However, for some, financial constraints hindered them from pursuing additional schooling.

> Jeniffer (30): But, potentially I could go back to school for a bachelor's degree. The idea is never out of my mind. I mean it could take me a while to go back for that sort of thing. It might take me another 5 years until I actually go back for a degree. But it is not something that is ever too late… Some companies require a higher degree for a higher position with better money. It doesn't really matter how long you have been with them
>
> Jermaine (21): I gotta get the money to go back to school. And I get better trained.

Generally, the students expressed their conviction that further education was necessary in order to upgrade skills, maintain competitiveness, and secure continued employment. Students also realized that, depending on developments in the

economy, they might have to change their career over the course of their lives.

> Adrian (19): You wanna know as much as you can about yourself. You wanna be ahead of everybody. You wanna keep up with what is new in your field. You wanna stay on top of the game and beat everybody else.
>
> Alex (27): For every individual it is not possible to think anymore that they are gonna continue in one field for their whole life. Because things change and even if we don't need air conditioning anymore then we need to be flexible and possibly change into something else. The economy can also put pressure on you and you have to find something else.
>
> Angelo (20) I am always open to expanding my horizon. I don't want to limit myself to just one thing.

Increasing Chances for Success

The study respondents pointed to a number of personal qualities they could draw on to increase their chances for success. These included qualities such as persistence, stubbornness, getting along with people, determination, open-mindedness, persever-ance, and curiosity.

> Matthew (27) It's usually your own fault if you don't achieve what you want. Usually it is. Sometimes it's not. But, most of the time it's your own fault.
>
> Jeniffer (30): And the ones who don't achieve what they want, they didn't really want it. And it was someone else's fault. Usually they pick themselves up and they try it again and they usually end up succeeding. Somewhere I read something about people who were successful weren't really successful, they just failed more than anybody else. And they just tried it more than anybody else. They just tried it that many more times. I mean you could probably achieve anything here in America when you set your mind towards it.

The students expressed in their statements the view that the United States is still a place where, with determination and perseverance, an individual can accomplish anything he or she sets out to achieve. It all depends on the individual. Outside risk as a potential threat to success was not emphasized. In fact, one student dismissed discussion of risk altogether and argued that talking about risk is inappropriate for a male.

> Timothy (34): Can you go away from the idea that something can happen. Something is gonna happen. Come on. It seems not really the right thing to do for a man to talk about worries, concerns, and security.

Another student suggested that she preferred living in the present to concerning herself about her future. Though she took a passive stance towards career planning, she nevertheless complained that career counselors had not actively approached her. She described how she had been in a difficult living situation with her former boyfriend and admitted that she had made wrong choices in her life

> Deborah (23): You know most children are not concerned with their futures anyway. They think nothing can harm them. Teenagers think that nothing can touch them. I think it goes back to, what is it… sex and drugs, everything that you experience in high school. That's why we are not worried about the future. You are not worried about later, you are only worried about right now. We are having fun now.

Many students emphasized that they did not want to occupy themselves with worry over potential negative events for fear it might unmotivate them. The difficult living circumstances of some of the students contributed to the importance they placed on their own motivation. Self-motivation and the hope to achieve more stability and wealth in their lives appeared to be the driving force that kept many young adults on track to complete a technical degree.

Lisa was the only one of the study subjects who confessed to being a bit worried about finding a job. She was aware that her first job might not be exactly what she would want, but realized

she first needed to get a foot in the door. She admitted her greater fear concerned her ability to handle the unfamiliar life situation and the work conditions a new position in life might bring.

> Lisa (21): Yes, I do, I think when I get out of school will I be able to find a job. I think I will, but will I be able to handle it? And, will it be something that I like? I also wonder if I will be able to handle the hours.

The study participants' worries and concerns about the uncertainties of their futures seemed to be highly individualized and students seemed reluctant to talk about them in the focus groups. Except for the immigrants, fear of unemployment did not play a role for most of the students. Despite the overall optimism of the group, some students pointed out that they concentrated on the present and avoided long term planning deliberately, leaving themselves little opportunity to worry about the future.

Institutional Influences

The study participants' career decisions and life perspectives were also influenced by pressures and demands on the micro-structural level. During the interviews and focus group session, students reported social conditions that made attending school difficult for them. Financial concerns, the desire to have leisure time to spend on activities other than school work, encouragement, or lack of it, from parents, teachers, and friends; and the students' social environment, all played roles in the students' life planning strategies.

Some students stated that even though there may have been no money to pay for it, their parents expected them to acquire a college or university degree after completing high school. One student, however, pointed out that a bachelor's degree might actually be much less useful to her in finding a job than a degree from a technical college. Others said that their parents expected them simply to earn some kind of additional degree, though not necessarily a college diploma. Many of the students reported that their parents encouraged them to pursue education beyond high school and were glad that their children were attending school.

> Jeniffer (30): Well, my parents always expected me to go to school once I finish high school. They kind of expected me to go to college. Even if it wasn't sure how we gonna pay for it. They expected me to go. Even as I stopped going and worked in between I always had this idea, yes, I would be going back to school.

Although some parents had not graduated from college themselves, they encouraged their children to do so because they had experienced first-hand how difficult a career could be without some sort of advanced degree.

> June (20): My dad always said: "I don't want you to do anything but graduate from college." My dad never got a college degree. He started it, dropped out and never really went back. My mom got a master degree and she really pushes it. She wants everybody to go to school. But when you are a teenager you think, whatever, eventually I will get there. Well, you got your peers around you all the time and when your peers are not motivated, than you wouldn't be either.

Another student reported how her mother's lack of encouragement was superseded by the support and faith of her father and grandmother.

> Shenique (19): My mom, well I stay with her, but its like, my mom was never forceful about school or about the future. She was, like, well I have my boyfriends, and my children, whatever. I always had my dad. I was like my mom; I was never motivated to finish school, never motivated to go to college. He said: "Well you can stay in this environment but you don't have to be a part of it." With my dad, so I know I gonna finish school, I gonna make it without my mom motivating me; I gonna finish. And I always had my grandma. She is a pastor. She stands on [by] me. You gonna go to college, you are not like the family; you gonna move out of town and make your own.

Some students recognized that their single parents had had little time to devote to building the family foundation necessary to help the students surmount the difficulties they faced as they attempted to climb out of their familiar social environment.

> Nathalie (21) Yes, right now. I don't worry about one day you know, or next week. When you are young, you don't really think like that. That's why the counselor does not understand that, and also the parents. It's a difficult situation right now in many families, you know. There are a lot of single mothers and it's not easy. Parents are an important foundation and so we don't have a lot of that. So, we live a lot into now.

The study participants differed on the importance of friendships in their lives. While some young adults reported that they had close friends who influenced them in their life decisions, the majority of the students either indicated that they did not have real friends, or they had detached themselves from their peers in order to avoid what they perceived as their friends' negative influences.

> Shenique (19): I don't really have friends or I don't hang around my friends at all. My best friend is the only one I would talk to. Some of them stand their mom, but they are not doing it. They are not going to school anymore. They are not paying their rent. They are doing nothing. I don't stay with them; I stay on myself. I don't hang around with them because if I would I would do nothing with my life.

Many students in this study expressed dissatisfaction with advice they had received from school counselors. Deborah was disappointed that her school counselors did not seek out students and follow up with them on career decisions.

> Deborah (23): I mean it's like you have to hunt them down, instead of them. They are your counselors and should call us down and ask us about our future plans. "Deborah, what are you planning with your life," instead of us coming up to them. I just figured out everything on my own.

Yet, another student felt that he had received sound advice from secondary school counselors.

> Kevin (24): Yes, my high school counselor didn't really lead me to drafting, but she led me going back to school. She just generally encouraged me to go back to school and get a degree. I knew in my mind that I needed to do that, but by that moment I was just working and enjoying my life and enjoying my new vehicle.

Most of the students denied that they were influenced in their life planning decisions by macro-societal factors such as governmental policies and political ideologies. One participant conceded that for someone seeking to establish a business, the availability of government funding might be an influential consideration. Three students discussed standardized testing in schools and argued that the trend of imposing various tests on students does not lead to a better education. None of the students expressed interest in changing current power structures or concern for policy reforms.

> Alex (27): There is nothing you can do about the government in a direct and immediate sense. They're gonna do what they wanna do and it is gonna be as corrupt as it is until something major happens. Because as the system is set up the way it is now, it's very hard to change anything and people with good intentions who go in the government and want to change things, they get kicked out or buried by people who want to keep things the way they are. And because there is nothing that I can do in a direct way about it, what good would it do to worry about it? It only impairs my ability to function. It would make me unable to see the solution that is there. Einstein or somebody was saying you should not focus on the problem, you have to focus on the solution if you gonna see it. If that's what I am focused on in making myself a part of the problem by being frustrated about it, I never gonna see what needs to happen to make the change. It would limit my

> ability to function… There is a principle that you can not address a problem head on or that it is most difficult to address a problem head on. If you work at something, especially a government in any country you work on it piece by piece.

Alex stated that change can only be created by taking little steps on a personal level. He did not view people as a whole as a collective power or an agent of change. The role of the government was mostly ignored in students' discussions. Each student tended to view him or herself as the navigator of his or her own individual life path while showing little interest in involving themselves in the fates of others or in improving the overall well-being of society. The students felt free to make their own personal choices and perceived their country as a place where perseverance pays off and individual dreams can be fulfilled.

Discussion

From the analysis of the data collected in this study several major themes emerged regarding the students perceptions of risk and opportunity, their strategies for coping with the uncertainties of a continuously changing job market, and the underlying values which guide them in their planning for their futures.

Perceptions of risk and opportunity

Arum and Shavit (1995) highlighted the fact that technical education in the U.S. serves as a safety net for those who are unlikely to pursue 4-year college degrees. The young adults who participated in this study appeared to verify that finding. The students perceived that their technical college training enhanced their opportunities for employment in higher quality jobs. They believed that the skills they were learning were in high demand and held for them the promise of stable employment and financial independence. They saw the degrees they were earning of value not only for the opportunities of immediate employment, but also as foundations for future self-employment. The risk of unemployment was almost no issue for the young adults who participated in this study. The students

contended that a technical degree would protect them from unemployment. They felt assured that the technical degrees they were earning are both well recognized in industry and respected by individual consumers.

The young adults seemed disinclined to make concrete active life plans, but instead kept themselves open to opportunities that might come their way. They preferred to be in a waiting position. They appeared to be passive life planners, but indicated that they would become active life agents in the short term if a goal presented itself within reach. The students' life plans were highly individualized. They viewed the completion of a technical program as a step in their employment progression, and many students could imagine returning to school at some future time in their life to pursue further technical training or a degree in another field.

Coping with uncertainty

The study participants took different positions on the development and application of coping strategies. Many students took a highly flexible approach towards seeking employment. They tended to keep their options open and avoided making long-term professional commitments. The students hoped their technical degrees would provide them with stable employment that would last for several years and held on to dreams for the future in order to motivate and encourage themselves.

In general the students set short-term goals and did not follow linear long-range patterns. Long-term plans seemed only cursorily thought through, as indicated by the students' vague plans for eventual self-employment and their images of retirement at early ages. While the young adults in the study recognized the need to plan for the short term, many appeared to assume that they would somehow manage to surmount the steps in their life courses without a clear-cut plan. The students appeared to avoid concrete long-term planning. By focusing on the present or the very near future, the students' optimism remained high, while a longer view of life seemed to threaten to overwhelm and discourage them.

Cook and Furstenberg (2002) assert that Americans can be risk takers because there are few institutional restrictions that

limit their planning of a life course. Americans, they state, tend to be more short-term planners who live in the present, keeping the future at bay (Brannen and Nilsen, 2002). The technical college students in this study appeared to fit this mold. The coping strategies that most of the technical college students in this study employed were to suppress concern for the future and to adopt a simplified approach towards making life plans.

Despite the challenging conditions and difficulties which many of the technical college students faced, they expressed a great deal of satisfaction with their employment prospects as well as the outlook for their lives in general. Furedi (1997) wrote that in American society "the inflation of problems which is a characteristic of today's risk calculations follows logically from the decline of support for the perspective of social change" (p. 61). Furedi believed that a culture of uncertainty was created in order to protect the status quo. However, this uncertainty did not appear prevalent in the minds of the young adults who participated in this study. Perhaps their perception of their job security and their optimism was based on naivety. Perhaps they viewed the paths they were taking as their best options for improving their situations. Whatever the explanation, these young adults remained optimistic regarding their ability to make positive changes in their lives by dint of sheer personal effort.

Guiding Values

The most powerful guiding value articulated by the young adults who took part in this study was self-motivation. The students looked for ways to keep their motivation high and avoid thoughts or circumstances that threatened to bring it down. They expressed their desire to stay away from negative influences of family members or peers who might discourage them in their pursuit of their careers. The students emphasized the importance of being the agent of their own life courses. In the students' view, the way to succeed was to lift oneself up by one's own bootstraps.

The students were mostly left alone to make and fulfill their career decisions. Some of them were surrounded by people who had never pursued an advanced degree, and many of the students did not have role models to provide them outside encouragement. For most, there was no institutional career

placement agency to channel them into appropriate training programs. The technical college students appeared to sense that they were on their own.

Some students, emerging from difficult and unstable childhoods, had the desire to change their life styles in order to live differently from their family members and childhood surroundings. Like Shenique, who wanted her family "to be straight," other students in this study viewed education as a pathway out of an impoverished lifestyle.

For most of the young adults, work was seen as a means to make money and not as a meaningful way to promote self-development or make changes in their society. Only the drafting students expressed some sense of identification with their chosen occupation.

The young adults in this study were highly independent and individualized. They did not view the government or public policies as helps to them in planning for their futures except, perhaps, as possible future source of funds. In general, they saw the concerns and events of large institutions as beyond their control and of little import to them personally.

Conclusion

The findings of this study may enhance the understanding of underlying perceptions as well as preferences, values, and visions that influence young adults' decisions about the transition from school to work and elucidate how these decisions are related to unique cultural realities. The study provides information that may help identify what drives young adults to make decisions regarding their professional future. Leisering and Leibfried (1999) pointed out that the United States places a strong emphasis on education, less emphasis on social security, and little emphasis on risk management. In this study, the young adults reported little perception of risk as they contemplated their life paths. These findings may provide information to encourage or influence the debate about the meaning and purpose of risk protection and the social consequences of it.

This study accentuates the need for schools to establish techniques for assisting a student in coping with uncertainty in his or her life planning course (Asbrand, 2005). Young adults

need to learn how to make constructive decisions and be equipped with the methods to carry them through to completion. Schools need to reconsider how to prepare young adults for the requirements of the labor market and how to provide them with the tools they need to meet job search and work place challenges. School counselors must concentrate more on guiding students through consideration of their employment options and career goals. Counselors should become aware of the students' values, beliefs, and attitudes in order to understand their perspectives and their needs. In addition, teachers need to address students' concerns and develop a pedagogy that prepares young adults for a world where they become active, participatory agents of their own life courses (Heinz, Kelle, Witzel, Zinn, 1998).

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Critical Problems Facing Technology Education: Perceptions of Indiana Teachers

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In 1993 Wicklein conducted a study to determine both the present and the future critical issues and problems facing the technology education (TE) profession. Wicklein (1993) stated, "If the classroom teachers, teacher educators and the supervisors/ administrators of technology education hope to direct the profession into a desirable future they must understand the issues and problems that will influence the success or failure of technology education" (pp. 55-56). At that time, following its name change from industrial arts in 1985, TE stood in its formative years. As with the implementation of any revised system, there were problems and concerns with the new TE discipline (Linnell, 1992).

The Wicklein study questioned 25 panelists from 15 states and the District of Columbia to ascertain the issues and problems facing TE. The panel consisted of seven secondary classroom teachers, nine teacher educators, and nine secondary and collegiate supervisors and administrators. Wicklein used a four-round Delphi process to determine and prioritize the critical issues and problems in TE.

The 15 future problems identified by Wicklein in the 1993 study are listed, in order of priority, in Table 1. In accordance with Wicklein's panelists' predictions, many of these problems are those that face TE educators today. However, in the Wicklein study, only seven of the panelists were classroom teachers. The present study investigates the severity of these problems in

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Table 1
Future problems in technology education in order of priority as identified by Wicklein

Rank #	Problem
1	Insufficient quantities of TE teachers and the elimination of teacher education programs in TE
2	Loss of TE identity; TE absorbed within other disciplines
3	Poor and/or inadequate public relations for TE
4	Non-unified curriculum for TE
5	Ignorance among general populace regarding technology and discipline of TE
6	Inadequate involvement of TE personnel in education reform issues
7	Elimination of TE programs
8	Reduction of enrollment in TE courses due to high school graduation requirements
9	Insufficient funding of TE programs
10	Inadequate business and industry support for TE
11	Inadequate research base for TE
12	Inadequate knowledge base for TE
13	Inadequate leadership and leadership training for TE
14	Inferior in-service training for TE
15	Inappropriate certification procedures for TE

schools today as perceived by current Indiana high school and middle school TE teachers.

Research Questions

This study sought to answer the following two research questions:

1. What is the current level of severity of the 15 future problems identified by Wicklein (1993) as perceived by Indiana TE teachers?
2. Do Indiana TE teachers' perceptions of the 15 future problems (Wicklein, 1993) differ based on the Indiana teachers' demographic characteristics?

Design of the Study

The current study used a blended research methodology that combined both quantitative and qualitative data analyses. Brewer and Hunter (1989) reported, "The multi-method approach is a strategy for overcoming each method's weaknesses and limitations by deliberately combining different types of methods within the same investigations" (p. 11). The quantitative and qualitative methodologies used in the current study enabled the researchers to investigate various dimensions of the study subjects' responses.

The quantitative data for this study were collected using a descriptive survey. According to McMillan and Schumacher (1997), "Surveys are used frequently in educational research to describe attitudes, beliefs, opinions, and other types of information" (p. 38). Since the current study sought to determine if the perceived severity of the future problems in TE cited in Wicklein's (1993) report is related to demographic variables, this methodology was deemed appropriate. The researchers obtained the qualitative data by allowing the respondents an opportunity to provide free-responses and to list current problems not specifically identified on the survey instrument.

Population and Sample

The researchers acquired a list of 1,043 TE teachers from the Indiana Department of Education. A simple random sample of 747 of these teachers served as the sample for this study. Each teacher in the sample was mailed a cover letter, the survey instrument, and a postage-paid return envelope. A total of 267 surveys were returned, which represented a return rate of 35.7%.

Instrument

According to Gall and Borg (1996), "The purpose of a survey is to use questionnaires or interviews to collect data from participants in a sample about their characteristics, experiences, and opinions in order to generalize the findings to a population that the sample is intended to represent" (p. 289). In the present study, the first section of the survey instrument collected each participant's demographic data, which included gender, highest

degree earned, grade level taught, number of years of teaching experience, school community type, and his or her age.

In the second section of the survey, the TE teachers were provided a list of the 15 future problems identified by Wicklein (1993) and asked to rate each problem's severity using a four-point Likert-type scale. The Likert-type scale was based upon a similar instrument used by VanderJagt, Shen, and Hsieh (2001) in a study that examined elementary and secondary public school principals' perceptions of school problems. The four-point Likert-type scale values were 1 = not a problem, 2 = minor problem, 3 = moderate problem, and 4 = serious problem. To obtain qualitative data, the instrument provided an opportunity for the teachers to submit free-response comments concerning the TE field.

Data Analysis

Of the 267 survey respondents, 258 were male (96.6%) and nine were female (3.4%). The majority of the TE teachers who responded to the survey had earned a master's degree (76.8%), were over 40 years of age (77.9%), taught in a high school setting (55.4%), and taught in a rural or town environment (66.3%). Table 2 summarizes the respondents' demographic data.

Research question one sought to determine the TE teachers' overall perceptions of the level of severity of each of the 15 future problems identified by Wicklein (1993). To address this question, means and standard deviations of the teachers' ratings of the severity of each problem listed in the survey were computed. Since the Likert-type scale values ranged from 1 (not a problem) to 4 (a serious problem), problems perceived as most serious are those with mean scores closest to 4 (see Table 3).

Overall, of the 15 problems, the TE teachers rated the impact of high school graduation requirements on the enrollment in TE courses as the most serious problem (M = 3.12, SD = 0.98). The problem of the general public's lack of understanding of TE received the second highest mean score (M = 3.02, SD = 0.86). Although the problem of insufficient funding for TE programs received the third highest mean score (M = 3.00, SD = 1.00), its mean score value of 3.00 indicated that respondents saw it overall as a "moderate," rather a "serious," problem for the TE field.

Table 2
Demographic descriptions of respondents

	TE teachers $n = 267$	
Highest degree earned:		
Bachelor's	57	(21.3%)
Master's	205	(76.8%)
Years of age:		
Less than 30	23	(8.6%)
31-40	28	(10.5%)
41-50	77	(28.8%)
51-60	115	(43.1%)
Over 60	16	(6.0%)
Years teaching experience:		
0-4	21	(7.9%)
5-10	26	(9.7%)
11-15	26	(9.7%)
16-20	25	(9.4%)
21-25	32	(12.0%)
26-30	61	(22.9%)
31-35	75	(28.1%)
School type:		
High school 9-12	148	(55.4%)
Middle school 6-9	71	(26.6%)
Middle/high school 7-12	45	(16.9%)
Community type:		
Rural	113	(42.3%)
Town	64	(24.0%)
Suburban	50	(18.8%)
Urban	40	(15.0%)

* Some responses contained missing data.

Research question two focused on the differences among the TE teachers' perceptions of the severity of Wicklein's cited problems based on the teachers' demographic characteristics. To answer this question, the data were analyzed using one-way analyses of variance (ANOVAs) to compare item response means among demographic groups. For each ANOVA, the categorical

variable was the level of respondents' demographic characteristic, and the dependent variable was the respondents' mean score on each survey item. All significant ANOVAs were followed by a Tukey's post-hoc test to determine which demographic group(s) differed significantly from the others. All ANOVAs and post-hoc tests used the .05 level of significance. For demographic items with only two categories, independent sample *t*-tests were used to

Table 3
Respondents' ratings of severity of Wicklein's future problems in technology education

Wicklein's Problem #	*M*	*SD*	Not a problem	Minor Problem	Moderate problem	Serious problem
8	3.12	.98	21 (8.0%)	48 (18.4%)	70 (26.8%)	122 (46.7%)
5	3.02	.86	15 (5.6%)	53 (19.9%)	111 (41.7%)	87 (32.7%)
9	3.00	1.00	26 (9.9%)	53 (20.2%)	78 (29.7%)	106 (40.3%)
7	2.93	.98	28 (10.7%)	51 (19.5%)	92 (35.2%)	90 (34.5%)
2	2.86	1.01	35 (13.3%)	52 (19.8%)	91 (34.6%)	85 (32.3%)
3	2.78	1.00	36 (13.5%)	62 (23.3%)	92 (34.6%)	76 (28.6%)
1	2.71	1.05	46 (17.5%)	57 (21.7%)	86 (32.7%)	74 (28.1%)
6	2.70	.98	35 (13.6%)	71 (27.6%)	88 (34.2%)	63 (24.5%)
14	2.66	.97	38 (14.6%)	69 (26.5%)	96 (36.9%)	57 (21.9%)
10	2.52	1.01	49 (18.6%)	82 (31.1%)	80 (30.3%)	53 (20.1%)
13	2.47	.98	48 (18.8%)	82 (32.2%)	81 (31.8%)	44 (17.3%)
4	2.43	1.09	70 (26.3%)	68 (25.6%)	71 (26.7%)	57 (21.4%)
11	2.26	1.03	77 (28.9%)	82 (30.8%)	68 (25.6%)	39 (14.7%)
12	2.18	.94	67 (26.8%)	95 (38.0%)	63 (25.2%)	25 (10.0%)
15	2.08	1.01	92 (36.5%)	77 (30.6%)	55 (21.8%)	28 (11.1%)

assess whether the means of the two groups differed statistically from each other. All *t*-tests used the .05 level of significance. The separate variance *t*-test and the Welch test were used to control type-one error. When only two groups were being compared, the separate variance *t*-test was selected when the Levene's test reported that unequal group variances were present. If more than two groups were being compared, the Welch test was selected as a substitute for the *F*-test when conditions of heterogeneous variance were detected by Levene's test. The Welch test is considered robust with regard to violations of unequal variances (Welch, 1938). The type-one error rate was maintained at the .05 level for each statistical test.

Comparisons by Highest Degree Earned

Table 4 contrasts the mean ratings for the 15 cited problems calculated for the group of teachers whose highest degree was a bachelor's degree compared to the mean ratings calculated for teachers with masters' degrees. In comparing the two groups, the greatest difference in the means occurred for the survey item that concerned the problem of a non-unified TE curriculum. The independent samples *t*-test revealed that TE teachers with masters' degrees perceived the problem of a non-unified TE curriculum as more severe (M = 2.56) than did the teachers with bachelors' degrees (M = 2.04) (t = 3.45, df = 97, p = .001). Teachers with masters' degrees also rated the elimination of TE programs as a more severe problem (M = 3.00) than did the teachers whose highest degree was a bachelor's degree (M = 2.69) (t = 2.12, df = 254, p = .035). The impact on enrollment in TE courses due to new graduation requirements was also ranked as a more severe problem by teachers with masters' degrees (M = 3.18) than by those with bachelors' degrees (M = 2.88) (t = 2.07, df = 254, p = .040).

Comparisons by Grade Level Taught

The survey data were also analyzed to determine if the respondents' perceptions of the severity of the 15 future problems identified by Wicklein (1993) differed depending on the grade levels that the teachers taught. Respondents were grouped into three categories: high school teachers (grades 9-12); middle school

Table 4
Comparisons of responses by highest degree earned

Wicklein's Problem #	Bachelor's			Master's		
	M	*SD*	*n*	*M*	*SD*	*n*
1	2.72	1.05	57	2.72	1.06	201
2	2.69	0.98	55	2.91	1.02	203
3	2.63	1.00	56	2.82	1.01	205
4	2.04	0.97	56	2.56	1.10	205
5	2.91	0.85	57	3.05	0.86	204
6	2.66	0.96	53	2.72	1.00	199
7	2.69	0.96	55	3.00	0.98	201
8	2.88	0.97	56	3.18	0.98	200
9	3.00	0.98	55	3.01	1.02	203
10	2.52	0.91	56	2.54	1.04	203
11	2.18	0.95	57	2.31	1.05	204
12	2.00	0.87	54	2.24	0.96	191
13	2.33	0.84	55	2.50	1.03	195
14	2.64	0.96	56	2.66	0.99	199
15	2.21	1.08	53	2.03	0.99	194

Table 5
Highest degree earned independent samples test

Wicklein's Problem #	Problem	*t*-test for Equality of Means				
		t	*df*	Sig. 2-tailed	*MD*	*SED*
4	Non-unified curriculum for TE	3.45	97	0.001	0.52	0.16
7	Elimination of TE programs	2.12	254	0.035	0.31	0.15
8	Reduction of enrollment in TE courses due to high school graduation requirements	2.07	254	0.040	0.31	0.15

teachers (grades 6-9); and teachers who taught grades 7-12, spanning both high school and middle school. The results of the findings are tabulated in Table 6. Table 7 shows the significant findings of the one-way ANOVAs.

Table 6
Comparison of responses by grade level taught

Wicklein's Problem #	High School 9-12			Middle School 6-9			Grades 7-12		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
1	146	2.78	1.00	70	2.60	1.16	44	2.66	1.06
2	147	3.00	0.93	68	2.66	1.14	45	2.67	1.04
3	148	2.93	0.96	70	2.60	1.04	45	2.58	1.03
4	148	2.62	1.06	70	2.20	1.11	45	2.13	1.06
5	147	3.11	0.83	71	2.86	0.98	45	2.98	0.78
6	142	2.80	0.96	68	2.54	1.07	44	2.59	0.92
7	146	2.99	0.94	67	2.81	1.05	45	2.91	1.04
8	148	3.08	1.02	66	3.17	0.92	44	3.14	0.95
9	147	3.01	1.02	70	2.87	1.01	43	3.23	0.87
10	147	2.49	1.02	69	2.62	1.07	45	2.44	0.89
11	148	2.33	1.01	71	2.24	1.06	44	2.07	1.04
12	139	2.28	0.95	66	2.00	0.91	43	2.14	0.97
13	142	2.65	0.95	67	2.28	1.03	43	2.14	0.91
14	145	2.81	0.94	68	2.54	0.98	44	2.34	0.99
15	137	2.26	1.02	69	1.86	0.91	43	1.81	1.01

Teachers in all three types of schools rated the impact of new graduation requirements as first or second in terms of severity. However, the means for the problem pertaining to the lack of unity in the TE curriculum showed statistically significant differences among the three categories of teachers. ($F_{(2,260)} = 5.69$, $p = .004$). Post hoc comparisons (see Table 8) revealed that TE teachers who taught in high schools perceived the non-unified curriculum as a more severe problem ($M = 2.62$) than did those who taught in middle schools ($M = 2.20$). The high school teachers also rated the problem of a lack of a unified curriculum as more severe than did the teachers who taught grades 7-12 ($M = 2.13$).

When grouped by grade level taught, differences also appeared in the teachers perceptions of the problem of inadequate leadership and leadership training for TE ($F_{(2,249)} = 6.15$, $p = .002$). Post hoc comparisons found that TE teachers who taught in high schools perceived the problem of leadership and leadership

Table 7
Grade level taught ANOVA

Wicklein's Problem #		*SS*	*df*	*F*	Sig.
2	Between Groups	7.226	2	3.554	0.030
	Within Groups	261.221	257		
	Total	268.446	259		
3	Between Groups	7.544	2	3.815	0.023
	Within Groups	257.102	260		
	Total	264.646	262		
4	Between Groups	13.093	2	5.689	0.004
	Within Groups	299.211	260		
	Total	312.304	262		
13	Between Groups	11.509	2	6.145	0.002
	Within Groups	233.169	249		
	Total	244.679	251		
14	Between Groups	8.822	2	4.773	0.009
	Within Groups	234.726	254		
	Total	243.549	256		
15	Between Groups	10.719	2	5.468	0.005
	Within Groups	241.121	246		
	Total	251.839	248		

training as more severe (M = 2.65) than either middle school teachers (M = 2.28) or teachers who taught grades 7-12 (M = 2.14). Another area in which differences between the three groups arose was in their perceptions of the severity of the problem of inappropriate certification procedures for TE. ($F_{(2,246)}$ = 5.47, p = .005). Analyses by post hoc comparisons showed that high school TE teachers perceived inappropriate certification procedures as a more severe problem (M = 2.26) than did teachers who taught in middle school (M = 1.86) and also more severe than did those teachers who taught in grades 7-12 (M = 1.81).

Table 8
Grade level taught multiple comparisons Tukey HSD

(Wicklein's Problem #) Dependent Variable	(I) Grade Level Taught	(J) Grade Level Taught	*MD* (I-J)	Std. Error	Sig.	95% C.I. Lower	95% C.I. Upper
4	9-12	6-12	0.42	0.15	0.020	0.05	0.79
	7-12	9-12	-0.49	0.18	0.022	-0.92	-0.06
13	9-12	6-12	0.36	0.14	0.031	0.03	0.70
		7-12	0.51	0.17	0.008	0.11	0.91
14	9-12	7-12	0.47	0.17	0.013	0.08	0.86
	7-12	9-12	-0.47	0.17	0.013	-0.86	-0.08
15	9-12	6-12	0.40	0.15	0.018	0.06	0.75
		7-12	0.44	0.17	0.030	0.03	0.85

Comparisons by Years of Teaching Experience

A respondent's number of years of teaching experience also appeared to affect his or her perceptions of the severity of several of the 15 cited problems. Table 9 shows the teachers' ratings when grouped by the teachers' years of teaching experience. The significant findings of the one-way ANOVAs are summarized in Table 10.

When grouped by number of years of teaching experience, the respondents showed differences in their perceptions of the severity of the problem concerning the lack of unity in the TE curriculum. ($F_{(6,258)} = 3.50$, $p = .002$). Post hoc comparisons (see Table 11) verified that TE teachers who had taught in the range of 16-20 years perceived this problem as more severe ($M = 2.88$) than did those who had taught 0-4 years ($M = 1.90$). Those who had taught 31-35 years also rated the problem of a non-unified curriculum statistically significantly higher in terms of severity ($M = 2.72$), than teachers who had taught 0-4 years ($M = 1.90$).

The severity of the problem of an inadequate research base for TE also differed in the teachers' perceptions when compared by years of teaching experience ($F_{(6,258)} = 2.63$, $p = .017$). When grouped by number of years of teaching experience, post hoc comparisons found that TE teachers who had taught in the

range of 31-35 years perceived the lack of an adequate research base as a more severe problem (M = 2.51) than did those who had taught 11- 15 years (M = 1.81).

Table 9
Comparison of responses by years of teaching experience

	0-4 Years			5-10 Years		
Wicklein's Problem #	*M*	*SD*	*n*	*M*	*SD*	*n*
1	2.86	1.06	21	2.54	0.86	26
2	2.65	0.99	20	2.85	1.05	26
3	2.52	0.87	21	2.62	1.06	26
4	1.90	0.77	21	2.00	0.94	26
5	2.90	0.70	21	3.00	0.94	26
6	2.52	0.98	21	2.80	0.91	25
7	2.71	1.10	21	2.65	0.89	26
8	2.76	0.83	21	3.00	1.15	25
9	2.85	1.04	20	2.88	1.11	26
10	2.33	1.02	21	2.23	0.95	26
11	2.29	0.90	21	1.81	0.98	26
12	1.95	0.92	21	2.08	0.91	25
13	2.29	0.96	21	2.31	0.79	26
14	2.67	1.11	21	2.68	0.95	25
15	2.10	1.09	21	2.16	1.11	25

	11-15 Years			16-20 Years		
1	2.85	1.22	26	3.04	1.02	25
2	2.71	1.08	24	2.46	1.02	24
3	2.68	0.99	25	2.64	0.99	25
4	2.20	1.15	25	2.88	1.05	25
5	2.92	0.93	26	2.96	0.89	25
6	2.87	0.87	23	2.64	1.08	25
7	2.91	0.95	23	2.68	1.03	25
8	2.96	1.06	25	3.20	1.00	25
9	3.16	1.03	25	2.71	0.86	24
10	2.20	1.00	25	2.36	1.11	25
11	1.81	0.85	26	2.44	1.00	25
12	1.86	0.85	21	2.29	0.95	24
13	2.52	0.95	23	2.54	1.06	24
14	2.71	0.91	24	2.60	1.19	25
15	2.05	0.94	20	2.08	0.97	24

Table 9 continued

	21-25 Years			26-30 Years			31-35 Years		
Wicklein's Problem #	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
1	2.86	1.03	29	2.65	1.01	60	2.57	1.13	75
2	2.97	0.86	32	3.00	0.95	61	2.92	1.10	75
3	2.88	0.94	32	2.84	0.97	61	2.91	1.10	75
4	2.28	1.17	32	2.43	1.12	61	2.72	1.07	75
5	3.09	0.78	32	2.92	0.79	60	3.13	0.96	75
6	2.60	1.00	30	2.61	0.98	59	2.77	1.03	73
7	2.93	0.94	30	3.17	0.94	60	2.99	1.01	75
8	3.09	0.96	32	3.19	0.91	58	3.24	0.99	74
9	3.10	0.91	31	3.20	0.96	61	2.92	1.05	75
10	2.59	0.91	32	2.73	1.06	60	2.62	0.99	74
11	2.19	1.06	32	2.30	0.94	60	2.51	1.14	75
12	2.17	0.97	29	2.19	0.84	59	2.36	1.05	70
13	2.17	1.07	29	2.46	0.95	57	2.69	1.03	74
14	2.52	1.03	31	2.66	0.88	59	2.73	0.98	74
15	1.86	0.99	29	2.02	0.98	58	2.16	1.05	74

Table 10

Years of teaching experience ANOVA

Wicklein's Problem #		*SS*	*df*	*F*	Sig.
4	Between Groups	24.00	6	3.50	0.002
	Within Groups	294.96	258		
	Total	318.96	264		
11	Between Groups	16.29	6	2.63	0.017
	Within Groups	266.74	258		
	Total	283.03	264		

Table 11
Years of teaching experience multiple comparisons Tukey HSD

(Wicklein's Problem #) Dependent Variable	(I) Number of Years Teaching	(J) Number of Years Teaching	*MD* (I-J)	*SE*	Sig.	95% Confidence Interval	
						Lower	Upper
4	0-4	31-35	-0.82	0.26	0.036	-1.60	-0.03
	16-20	0-4	0.98	0.32	0.037	0.03	1.92
11		31-35	-0.70	0.23	0.044	-1.39	-0.01
	11-15	31-35	-0.70	0.23	0.044	-1.39	-0.01

Comparisons by Instructor's Age

Respondents were also grouped according to their ages to determine if the age of the instructor affected his or her perception of the severity of the 15 cited problems. Table 12 shows a summary of the respondents' ratings when analyzed by the instructors' age groups. The significant findings of the one-way ANOVAs are summarized in Table 13. The data showed that the instructor's age had a bearing on his or her perception of the severity of the problem concerning the reduction of enrollment in TE courses due to high school graduation requirements ($F_{(4,248)}$ = 2.86, p = .024). No pair wise differences were found in the post hoc analysis.

However, post hoc comparisons, summarized in Table 14, confirmed that an instructor's age had a bearing on his or her perception of the severity of the problem of a lack of an adequate research base for TE ($F_{(4,253)}$ = 3.78, p = .005). TE teachers who were 61 years old or older perceived the inadequate research base for TE as a more severe problem (M = 3.06) than did either the group of teachers aged 31-40 years (M = 1.93) or the group aged 41-50 years (M = 2.12).

The instructor's age also related to his or her perception of the severity of the problem of inadequate leadership and leadership training for TE. ($F_{(4,243)}$ = 2.92, p = .022). Again, the older TE teachers (aged 61 or older) perceived the lack of leadership and leadership training as a more severe problem for TE (M = 3.00) than did TE teachers in the 41-50 year age bracket. (M = 2.22).

Table 12
Comparisons of responses by instructor's age

	21-30			31-40			41-50		
Wicklein's Problem #	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
1	3.04	0.82	23	2.82	1.02	28	2.72	1.04	74
2	2.95	0.90	22	2.70	1.07	27	2.71	0.99	76
3	2.48	0.95	23	2.71	1.01	28	2.75	0.92	77
4	2.09	1.00	23	2.32	1.09	28	2.34	1.12	77
5	2.96	0.82	23	3.04	0.88	28	2.94	0.83	77
6	2.65	0.98	23	2.74	0.90	27	2.60	0.97	72
7	2.74	0.96	23	2.81	1.00	27	2.76	1.02	75
8	2.91	0.85	23	3.26	1.02	27	2.88	1.05	77
9	2.87	1.01	23	2.82	1.09	28	2.88	0.98	74
10	2.17	1.03	23	2.29	0.98	28	2.36	1.00	77
11	2.17	0.94	23	1.93	0.98	28	2.12	0.97	77
12	2.00	1.00	23	2.20	0.91	25	2.11	0.87	71
13	2.35	0.93	23	2.48	0.89	27	2.22	1.01	72
14	2.65	0.93	23	2.78	1.09	27	2.51	1.01	75
15	2.05	1.09	22	2.15	1.08	26	1.91	0.88	70

Comparisons by Community Type

The type of community—urban, suburban, town, or rural—in which a teacher taught was also examined to see if community setting related to a TE teacher's perceptions of the severity of Wicklein's future problems. Urban schools were defined as those located in a city or densely populated area. Suburban schools were considered as those located in residential districts on the outskirts of cities. A school located in an urban area with a fixed boundary smaller than a city was defined as a town school. A rural school was defined as a school located in a sparsely settled or agricultural area. The rankings for the severity of the problems as calculated when teachers were grouped by their school community types is noted in Table 15. The significant findings of the one-way ANOVAs are summarized in Table 16.

Table 12 continued

	51-60			61+		
Wicklein's Problem #	*M*	*SD*	*n*	*M*	*SD*	*n*
1	2.63	1.12	114	2.69	1.08	16
2	2.97	1.05	114	3.06	1.00	16
3	2.89	1.07	114	3.00	1.03	16
4	2.51	1.12	114	3.00	0.73	16
5	3.03	0.94	114	3.44	0.63	16
6	2.69	1.06	111	3.19	0.66	16
7	3.13	0.96	112	3.06	0.77	16
8	3.27	0.92	110	3.50	0.89	16
9	3.11	1.03	114	3.31	0.87	16
10	2.72	1.03	112	2.81	0.83	16
11	2.33	1.09	114	3.06	0.85	16
12	2.17	1.00	107	2.75	0.86	16
13	2.60	0.98	110	3.00	0.97	16
14	2.69	0.95	112	3.13	0.83	15
15	2.20	1.08	111	1.93	0.80	15

Table 13

Instructor's Age ANOVA

Wicklein's Problem #		*SS*	*df*	*F*	Sig.
8	Between Groups	10.65	4.00	2.86	0.024
	Within Groups	230.78	248.00		
	Total	241.43	252.00		
11	Between Groups	15.74	4.00	3.78	0.005
	Within Groups	263.38	253.00		
	Total	279.12	257.00		
13	Between Groups	11.10	4.00	2.92	0.022
	Within Groups	230.80	243.00		
	Total	241.90	247.00		

Table 14
Instructor's Age Multiple Comparisons Tukey HSD

(Wicklein's Problem #) Dependent Variable	(I) Age	(J) Age	*MD* (I-J)	*SE*	Sig.	95% C.I. Lower	95% C.I. Upper
11	31-40	61+	-1.13	0.32	0.004	-2.01	-0.26
	41-50	61+	-0.95	0.28	0.008	-1.72	-0.18
13	41-50	61+	-0.78	0.27	0.034	-1.52	-0.04

The analysis of the data revealed differences occurred in the teachers' perceptions of the severity of the problem of poor and/or inadequate public relations for TE depending on the type of community in which their school was located. ($F_{(3,262)} = 5.41$, $p = .001$). TE teachers who taught in schools located in towns perceived poor and/or inadequate public relations for TE as a more severe problem ($M = 3.13$) than did those who taught in rural schools ($M = 2.56$). Post hoc comparisons summarized in Table 17 confirmed the statistical significance of these differences.

The teachers' perception of the severity of the problem of a non-unified TE curriculum also differed depending on the type of school community in which the teacher taught. ($F_{(3,262)} = 3.05$, $p = .029$). Post hoc comparisons revealed that TE teachers who taught in urban schools felt the lack of a unified curriculum was a more severe problem ($M = 2.90$) than did those who taught in rural schools ($M = 2.32$).

The problem of inappropriate certification procedures for TE also showed differences in rankings when respondents were grouped by community type. ($F_{(3,248)} = 2.80$, $p = .041$). Post hoc comparisons showed that TE teachers who taught in urban schools perceived inappropriate certification procedures as a more severe problem ($M = 2.33$) than those who taught in suburban schools ($M = 1.74$).

While all four groups rated insufficient funding for TE programs as a minor to moderate problem, the severity ratings for this problem also showed differences related to community type ($F_{(3,259)} = 5.53$, $p = .001$). Post hoc comparisons found that TE teachers who taught in rural schools ranked the problem of

Table 15
Comparison of responses by community type

Wicklein's Problem #	Rural			Town		
	M	*SD*	*n*	*M*	*SD*	*n*
1	2.58	1.05	112	2.94	1.01	63
2	2.79	0.96	112	2.84	1.05	63
3	2.56	0.97	113	3.13	0.88	64
4	2.32	1.05	113	2.42	1.18	64
5	2.95	0.83	112	3.09	0.79	64
6	2.69	0.88	109	2.68	0.98	60
7	2.95	0.93	111	2.98	1.00	64
8	3.15	0.96	111	3.09	1.05	64
9	3.18	1.00	112	2.73	0.94	63
10	2.54	0.89	112	2.38	1.15	64
11	2.18	0.98	112	2.42	1.14	64
12	2.07	0.86	106	2.28	1.06	60
13	2.37	0.95	107	2.65	0.97	60
14	2.60	0.99	112	2.75	0.93	63
15	2.07	1.03	106	2.18	0.98	60

insufficient funding as a more severe problem ($M = 3.18$), than either those who taught in town schools ($M = 2.73$) or those who taught in suburban schools ($M = 2.71$) At the same time, teachers who taught in schools located in urban areas perceived the problem of funding as more severe ($M = 3.30$) than those who taught in towns (M= 2.73) or those who taught in suburban areas (M = 2.71).

Wicklein's Problem #	Suburban			Urban		
	M	*SD*	*n*	*M*	*SD*	*n*
1	2.67	1.09	49	2.79	1.08	39
2	2.86	1.12	49	3.08	1.01	39
3	2.67	1.05	49	3.00	1.09	40
4	2.33	1.01	49	2.90	1.10	40
5	2.92	0.99	50	3.20	0.94	40
6	2.56	1.07	48	2.90	1.17	40
7	2.74	1.05	47	3.03	1.04	39
8	3.04	0.93	47	3.18	1.00	39
9	2.71	1.05	48	3.30	0.88	40
10	2.52	0.99	48	2.70	1.14	40
11	2.06	0.96	50	2.48	1.06	40
12	2.15	0.84	46	2.39	1.05	38
13	2.27	0.95	49	2.74	1.09	39
14	2.57	0.95	47	2.82	1.06	38
15	1.74	0.79	47	2.33	1.18	39

Table 15 continued

Qualitative Survey Responses

The survey respondents were also given the opportunity to provide free responses or to list current problems in the TE field that were not identified on the survey instrument. Many of the TE teachers' qualitative responses were consistent with Wicklein's (1993) list of future problem. Table 18 lists the topics that were identified by many respondents and that corresponded to Wicklein's themes.

The TE teachers indicated through their qualitative responses that they feel the public does not understand the TE discipline. In the view of the teachers, the public still perceives TE as "shop" and technology as "computers." The teachers also reported that they believe increased high school graduation requirements are affecting the TE field adversely. In addition, they feel that they, the TE teachers, do not have a voice in educational reform efforts.

Table 16

Community Type ANOVA

Wicklein's Problem #		*SS*	*df*	*F*	Sig.
3	Between Groups	15.70	3	5.41	0.001
	Within Groups	253.65	262		
	Total	269.35	265		
4	Between Groups	10.77	3	3.05	0.029
	Within Groups	308.52	262		
	Total	319.28	265		
9	Between Groups	15.84	3	5.53	0.001
	Within Groups	247.16	259		
	Total	263.00	262		
13	Between Groups	7.90	3	2.76	0.043
	Within Groups	239.68	251		
	Total	247.58	254		
15	Between Groups	8.44	3	2.80	0.041
	Within Groups	249.12	248		
	Total	257.57	251		

Table 17
Community Type Multiple Comparisons Tukey HSD

(Wicklein's Problem #) Dependent Variable	(I) Community Type	(J) Community Type	MD (I-J)	SE	Sig.	95% C.I. Lower	95% C.I. Upper
3	Rural	Town	-0.57	0.15	0.002	-0.97	-0.17
		Town	-0.57	0.15	0.002	-0.97	-0.17
4	Rural	Urban	-0.58	0.20	0.020	-1.10	-0.07
9	Rural	Town	0.45	0.15	0.020	0.05	0.85
		Suburban	0.47	0.17	0.029	0.03	0.91
	Town	Urban	-0.57	0.20	0.022	-1.08	-0.06
15	Suburban	Urban	-0.59	0.21	0.026	-1.13	-0.05
	Suburban	Urban	-0.59	0.22	0.036	-1.15	-0.03

Table 18
Qualitative survey responses grouped by Wicklein's themes

#	Problem	Frequency	%
1	Quantity of TE teachers: (n = 87)		
	Programs closing due to lack of teachers	11	12.6
	Hard to find teachers	11	12.6
2	TE identity: (n = 71)		
	Technology implies computers	14	19.7
	Not recognized by students, parents, & administrators	11	15.5
	People do not understand TE	10	14.1
3	Public relations: (n = 67)		
	Name causes confusion	8	11.9
4	TE curriculum (n = 82)		
	TE Curriculum is good	20	24.4
	TE curriculum is weak	19	23.2
	Curriculum is not being implemented consistently	13	15.9
	Lack of hands-on skills	9	11.0
5	General populace understanding: (n = 63)		
	Believes TE is "shop"	26	41.3
	Does not understand TE	16	25.4
6	Involvement in educational reform: (n = 60)		
	TE teachers do not have a voice	13	21.7
	No involvement by TE personnel	9	15.0
7	Health of TE programs: (n = 74)		
	Health is good	15	20.3
	Funding is a problem	11	14.9
8	Graduation requirements: (n = 78)		
	No room in schedule for electives	23	29.5
	Graduation requirements hurting TE	11	14.1
	TE should be required fro graduation	11	14.1
9	Funding: (n = 72)		
	Funding is not good	32	44.4
	Funding is good	17	23.6
10	Business and industry support: (n = 68)		
	Support is good	26	38.2
	Limited support	22	32.4

In two areas the qualitative responses to the survey revealed disparities among the teachers' views concerning current issues in the TE field. One of these areas regarded funding. While 44.4% of the respondents expressed the opinion that funding was "not good," another 23.6% indicated funding was "good." Business and industry support was another area in which respondents had differing views. Some 38.2% of the teachers stated their opinion that business and industry support was "good." On the other hand, 32.4% of teachers categorized business and industry support as "limited."

Discussion

Graduation Requirements

Overall, the TE teachers who responded to the current survey reported the problem of the impact of high school graduation requirements on TE courses as the most serious problem of the 15 future problems identified by Wicklein in his 1993 study. There were however, differences in the perceived severity of this problem when demographic groups were compared. Older teachers and/or those who had taught longer tended to view the impact of high school graduation requirements on TE as a more severe problem than did younger teachers and those who were new to the teaching field. Likewise, teachers who had earned a master's degree felt it was of greater concern to the TE field than did teachers whose highest degree was a bachelor's degree. However, it is interesting to note that middle school TE teachers rated the severity of this problem greater than did high school TE teachers.

Again when qualitative comments in the free-response section of the survey were tabulated, the most frequently cited problem was "graduation requirements harming TE" (11.9%). Some respondents stated that "students do not have room in their schedule for electives," or "TE needs to be required for graduation."

According to Stadt (1989), in many states English, mathematics, or science are allowed to gain control of the Carnegie units required for graduation, which reduces the opportunities for students to enroll in elective coursework.

Although Wicklein's (1993) study identified the impact of graduation requirements as a concern, nevertheless the problem at that time ranked eighth in order of priority. From both the qualitative and quantitative findings of the present study, it appears that graduation requirements and their effect upon TE enrollment are currently of primary concern to Indiana TE teachers.

Understanding of Technology

The Indiana teachers who participated in the current survey rated the problem of ignorance among the general populace regarding technology and the discipline of TE as the second most severe problem faced by the TE teachers. Qualitative feedback in the free-response section of the survey confirmed this concern. Free-responses included comments such as "technology implies computers" and the "name causes confusion." A Gallup poll conducted for the International Technology Education Association (ITEA) also revealed that the American public lacks a clear understanding of TE and technological literacy (Dugger and Rose, 2002). These conclusions were reinforced by additional data obtained by a follow up study by Dugger, Gallup, Rose and Starkweather (2004).

In Wicklein's (1993) study, the problem of the general public's lack of understanding of TE ranked fifth in order of priority. The current findings indicate that Indiana TE teachers view this problem as more serious than did the panelists in Wicklein's study. However, since the date of Wickleins's study, the proliferation of technological tools and gadgets has increased dramatically. According to Petrina (2003), after the microcomputer innovations of the late 1970s and 1980s, a digital technology revolution occurred in the 1990s. It is likely that this digital revolution has created greater confusion about technology since the time of the Wicklein study, and the Indiana teachers' who took part in the current study may have perceived this confusion among the general public and reflected it in their survey responses.

The mushrooming of technology in the last decade may also partly explain the frequency of qualitative response that the "focus of TE needs to change." Another explanation for this

response may be that some TE teachers see a need to incorporate more engineering into TE. The perception of a need for change in the discipline may also be linked to and partially based on the public's misunderstanding of TE and what it incorporates.

The fact that the majority (62.9%) of the teachers who responded to the survey had over 20 years of teaching experience and many (43.1%) were between the ages of 51 to 60, may provide another explanation for the statement that the focus of TE needs to change. Older teachers and those who had been in the field for 20 years or more were most likely trained as industrial arts teachers. These teachers may dislike the way the field has evolved into TE. They may not associate the same type of value with TE as they did with industrial arts. Their desire may be to see TE return to its industrial arts format.

Funding

Survey respondents ranked lack of sufficient funding as the third most serious problem for TE. These findings are substantiated by the literature which suggests there are problems with funding. Oaks (1991) surveyed TE supervisors in the 50 states to determine what state resources are available to assist in the transition to TE. Lack of funding was reported to be the most significant barrier to having an excellent TE program. According to Bussey, Dormody, and VanLeeuwen (2000), increased funding, development of financial incentives, and increased state-level support were listed as three of the five most frequently cited suggestions for strengthening TE.

Based on the findings of this study and other studies, the TE profession must address several critical issues in order to sustain itself as a discipline and assist American youth in developing the knowledge and skills required in the twenty-first century. Technology education must establish among the general public an understanding of its content and its relevance to society. This may require a name change and a redirection to a curricular content that is more widely understood and valued by the general public. In addition, technology education must establish itself as an essential component for high school graduation. These actions will require both bold leadership by the

discipline's professional associations as well as flexibility and innovation by its teachers.

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Journal Writing in Career and Technical Education: A Tool to Promote Critical Thinking Skills

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One of the defining characteristics of the twenty-first century workforce has been the appearance of high-skill, high-growth occupations for which job entry no longer requires a four-year degree (Brand, 2004). However, given the complexity and breadth of these jobs, job entry does require workers to have a complex array of problem solving skills. The workers of tomorrow must not only know how to make decisions for their own work roles; but they must also understand how the decisions they make may affect how others perform their roles. Brand (2004) suggests that today's education curriculum is not meeting the needs of most students. As a result students are not prepared for the workforce. One of the deficiencies lies in the significant gap in problem solving skills among high school students. Ultimately this gap will present these students with challenges as they prepare to enter the workforce. Career and technology educators must become more pragmatic, resourceful, creative, and flexible in their curriculum and delivery approaches if they are to provide students the critical thinking and problem solving skills they require in order to compete successfully for jobs in both the national and international work arenas.

In a study by Lundstrom and Booth (2002), the researchers found that the educational goal for most students was to learn information for the sole purpose of passing an exam. This focus on passing exams results in a surface approach to learning which is easy to encourage but hard to discourage in favor of a

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deeper, more thoughtful attitude toward mastering knowledge. To overcome the problem Lundstrom and Booth, as well as Boud (1992, 2001) and Park (2003), reasoned that students require tools to help them find connections between their course work and the real world. One of the tools the researchers proposed was a learning journal.

Many career and technical education programs (CTE) are based on developing the discerning practitioner. Learning journals are potentially powerful teaching and learning tools which can instill in students the practice of thoughtful and self-evaluation. Hatton and Smith (1995) state that reflective practice is often substantiated by the use of journaling or other reflective writing. Used effectively, journal writing provides a teaching method that promotes critical thinking and learning skills; skills that move the students from knowledge and comprehension of information through application, analysis, synthesis and evaluation (Park, 2003). Nevertheless, few efforts have been made to use learning journals in secondary or post-secondary education (Bartscher, Lawler, Ramirez, and Schinault, 2001; Dart, Boulton-Lewis, Brownlee, and McCrindle, 1998).

Benefits of Learning Journals

What is a learning journal? A learning journal is "an accumulation of material that is mainly based on the writer's process of reflection. It is written over a period of time, not 'in one go'" (Moon, 2002, p. 4). Essentially, a learning journal is a vehicle for individual reflection.

The use of learning journals encourages students to appraise their own learning and achievement as well as examine their thoughts and feelings about what they are learning. The journal entries serve as a resource by which the students can review their learning; comprehend how far they have progressed; and reflect on their personal work ethics, values, attitudes, beliefs, and motivations. In addition to promoting independent thinking, journaling also encourages students to take responsibility for their learning by making them more autonomous and active in the learning process. Learning journals assist learners in processing new information by motivating them to monitor their goals, to interrelate ideas and concepts that will

assist them in understanding and meaning, and to increase their self-awareness (Dart, et al, 1998).

In the academic context, journals provide a means for students to contemplate material that has been introduced in the classroom. In the personal context, journals provide opportunities for students to examine their self-development as students as well as their evolving professional development. In both contexts, journal writing serves as a tool to promote the constructive and reflective critical thinking process. That is, in the process of making sense of and understanding new information, journal writing enables students to recognize their own relevant ideas and beliefs, to evaluate these in terms of what is to be learned and how it is to be learned, and to decide whether or not to alter their ideas and beliefs (Dart, et al, 1998). Journaling activities reach the very core of what Plato, Socrates, and Aristotle viewed as the true purpose of education: intellectual training that begins with basic knowledge and is completed with theoretical and practical intelligence (Elias and Merriam, 1995).

Structure of Journal Writing

Despite the value and benefits of journal writing, the thought of incorporating journal writing activities into an already packed full curriculum might cause an instructor to run screaming down the hall. However before giving up in despair, take a few moments to envision how such an activity might be structured and assessed in a CTE classroom.

Journal writing has at least two formats, structured and unstructured. While there are many ways in which instructors can design and implement journal writing assignments, the method of introducing journal writing utilizing first a structured format and then gradually moving towards a more unstructured form may prove effective.

Structured Journal Format

For success with journal writing assignments in the CTE arena, initially students may be given detailed instructions regarding what should be included in their learning journals. Students can be provided specific items such as: topics, key points, format, and length of time and number of pages required

for each entry (Bain, Mills, Ballantyne, and Packer, 2002). Presenting the students with questions is another way of ensuring they keep on task. It is much easier for students to answer a question than to develop a thought process around newly created material. "The questions guide the process of journal writing so that initially there is a focus on describing, then on organizing and reviewing the material and finally on analysis of, and reflection on, the material" (Moon, 2002, p.85). Figure 1 provides an example of a structured journal assignment.

The structured format focuses the students' thoughts on specific concepts and clearly outlines what should be included in the entry. By providing precise questions, the instructor challenges the students to analyze the information and to form answers supported by their understanding of the information. Using a structured frame, the instructor can observe whether or not the students grasp the concept of a journaling assignment or if they are struggling to find meaning. Students who are struggling with the process need feedback as soon as possible to assist them in improving their writing skills and to move them from simple description to deeper reflection as well as to search for personal connections, solutions, and conclusions (Bain, et al, 2002).

Figure 1
Structured Journal Assignment

> In chapter 2 we discussed several safety practices in electrical trades and automated industrial systems to assist you in working safely with live electrical circuits. List these practices in the order you find most important (1 being the most important). Explain the importance of each practice. How you will comply or benefit from each practice? What are some of the possible implications for non-compliance?

Unstructured Journal Format

Once the students have become proficient utilizing the structured approach, they can gradually move towards a more unstructured form of journal writing. At this point the structured journal writing criteria are removed, and the students begin writing their entries in ways that best suit them and their needs. Figure 2 illustrates an unstructured journal writing assignment.

It is debatable whether any form of assigned journal writing activity is truly unstructured. Even when the instructor provides little or no criteria for journal entries, if students know that their journals will be assessed by a person in authority, they are likely to presuppose what they believe the assessor is expecting. Moon (2002) states, "The difference between structured and unstructured forms of journals is somewhat arbitrary and there is no reason why a journal should not start structured and them become unstructured as the learner gains more experience of writing" (p. 46). Although the structured format may prove beneficial in the early stages of the assignment it may prove to be more of an obstruction later on. Often times the largest increase in development and satisfaction in journal writing assignments occurs when the behavioristic, structured format is discarded and the students are permitted to engage in a more humanistic unstructured approach by writing freely over subject matters of their own choosing (Moon, 2002).

Figure 2
Unstructured Journal Assignment

> In chapter 2 we discussed safety issues in electrical trades and automated industrial systems. Which parts of this chapter are most critical for you to understand before doing live work? Why? Which parts are least beneficial? Why?

Moon (2002) recommends that with unstructured journal assignments, the instructor's role is to encourage and remind the students to

- Make each entry personal. Journal writing is a very personal type of learning and its usefulness is directly related to the extent to which each student internalizes the information.
- Be honest. Students will only truly learn from the experience if they honestly face the realities of who they are.
- Let the words flow. There is no need for students to censor their thoughts or try to organize them right off the bat. They should first capture the essence of their ideas. Later they can go back and reflect on and organize them.
- Be informal. Students should use their own words, words that they understand and that make sense to them.
- Dig for deeper understanding and meaning. Students should reflect on "truths" they have discovered through their own experiences. They should work towards finding answers to questions that are of importance to them.
- Be flexible. Once students have moved towards the unstructured approach, they should experiment with various ways to construct their journals. The object is for students to utilize their individual talents and find ways to express their own personal needs and future professional goals.
- Be selective. Students should write about those things which are of true value to them. The entries are about quality of thoughts, not quantity of words.
- Seek assistance. Students should seek out advice from peers and instructors whenever it is needed. (Moon, 2002).

Regardless of whether journal assignments are structured or unstructured, it is immensely beneficial if the instructor provides the students with examples of what he or she considers a good journal entry. The instructor should explain the merits and

relevance of the sample entry and the approach used in creating it. Instructors should prod students to go beyond basic descriptions of topics or issues and encourage them to look at different perspectives, to explore alternative solutions, and to articulate conclusions that are relevant to their personal experience (Bain, et al, 2002).

Assessment

In addition to determining the form of the learning journal assignments, the instructor must decide how, or if, the assignment will be assessed. Summsion and Fleet (1996) point out that "at present, there are substantial difficulties involved in attempting to identify and assess reflection. Given current methodological and pragmatic limitations, the assessment of reflection raises complex issues of consistency and equity, as well as border pedagogical and ethical concerns" (Conclusion section, ¶1). Despite the difficulties inherent in the assessment process, there is, nevertheless, a number of reasons to implement journal assessment. Assessment of learning journals can assist the instructors in ascertaining if the students comprehend the material or if they have completed the assignments. If journal entries are not assessed, a student who is intent on investing only a minimum amount of energy, will not put forth the effort necessary to make journaling valuable and worthwhile. (Kneal, as cited in Moon, 2002). Assessment of their journals ensures that students are accountable for their work.

Providing students with feedback on a journal requires greater sensitivity than other evaluation situations. Journal entries are, and should be, very personal. The students' journals should be treated as confidential and only discussed elsewhere if they contain information that poses a threat to a life. Cowan (as cited in Moon, 2002) provides some guidelines for an instructor's comments:

- Avoid writing comments in the first person. The journal dialogue is between the writer and him or herself, not between the writer and the instructor.
- Avoid suggestion of judgments. Let the writers decide for themselves what is appropriate.

- Ask a question or make a comment only when it is needed for clarification.
- Indicate places where more thinking might be appropriate or supportive. However, keep in mind the sense of ownership students may feel towards their journals and remain aware of the fact that instructor comments may be viewed as intrusive.
- Write comments in pencil or attach sticky notes or a separate page of comments. Students may be more receptive to comments that are written separately, rather than on the pages of their journals.

Assessments of learning journals may be either formative or summative. Formative assessments provide students with feedback on their work as they progress through class. A summative assessment, on the other hand, occurs after students complete their work and furnishes the students with an overall evaluation of the quality of the completed work, generally, though not always, by assigning the work a letter grade (Moon, 2002).

Journals can be assessed through either formative or summative methods without allocating a grade. Several alternative methods are possible. Instructors may require a student's journal to meet some criteria of completeness or quality before the student is allowed to progress to the next module or learning activity packet. Another journal assessment method is for instructors to allot a substantial number of points to all journals that are satisfactory and return those journals that are not satisfactory to the students for additional enrichment. Later, students may resubmit the journals. Or, instructors may advise students that a quality journal that meets pre-set criteria will increase their course grade by up to X% of a grade point (Moon, 2002).

When an instructor decides to assign grades to students' journals, he or she must determine what percentage of the course points will be allocated to the journal assignment. Often those who allocate a small percentage of points initially (10%) do so to ensure the journals are maintained. However, frequently these allocations are increased, sometimes dramatically, as the instructors become more confident of their ability to adequately

assess the journals and of the value the journals provide the students (Moon, 2002).

If the journals are to be graded, it is vital that instructors establish clear-cut assessment criteria in order to keep the assessment process fair for all students. If instructors assess journals on their "gut reactions" or personal interpretations, they risk grading inconsistencies (Sumsion and Fleet, 1996). With precise standards for assessment, instructors are better able to support the students in their learning (Wildman and Niles, 1987). Assessing the journals with established criteria tells the students that the instructor has a purpose for and perceives value in the learning journal assignment. Students will understand that journaling is not a futile activity, but one that the instructor believes will assist the students in developing problem solving skills and critical thinking ability.

Assessment of learning journals does not have to be complicated. Educators can develop rubrics as simple or complex as the nature of the program and the prominence of journal writing in the program dictates. Bloom's taxonomy of educational objectives, King and Kitchener's model of reflective judgment and structure of learning outcomes taxonomy are a few resources to look to for guidance in developing a rubric. Whatever the rubric format, the essential concept is that the students know and understand the journal assessment criteria.

One additional concern in assessing journals is the matter of how to address the volume of reading it creates for the instructor. Instructors can alleviate this problem by asking students to summarize information in their journals. Alternatively, instructors can ask the students to identify several key areas of their journals for assessment. Recognizing that not every entry will be a magnum opus, the instructor gives the students the opportunity to single out what they consider their best work. At the same time the instructor now has less requisite reading while still being able to scan the entire journal (Moon, 2002).

Conclusion

Journal writing is a multifaceted activity that can take many forms for many purposes. Learning journals stress a

concern for the learning process as well as or more than the learning product (Moon, 2002). Journaling makes students more aware of how and what they learn and enhances their over-all learning experience. Writing in their journals encourages students to self-reflect and self-evaluate.

Journal writing fosters independent thinking by the students, and presses students to take responsibility for their learning. In these ways, it makes them more autonomous and more active students (Bain, et al, 2002; Boud, 2001; Mannion, 2001; Morrison, 1996). By using journaling as an alternative form of assessment, career and technical education can move one step closer to narrowing the existing gap in problem solving skills among high school students. This, ultimately, will present these students with greater opportunities as they prepare to enter the workforce of the twenty-first century.

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Testing Equals Relevance in Technology Education

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The current climate in education suggests that two items are sovereign in schools: assessment and accountability. The passage of the *No Child Left Behind Act of 2001* (NCLB) required states to set up methods of assessment and accountability (NCLB, 2001). The president of the International Technology Education Association, Ken Starkman (2006) contends, "Most educators see accountability as queen and testing as king of this legislation" (p. 28). Now that every state has an assessment and accountability system, we must ask ourselves, where does technology education fit into these systems? As a profession we need to acknowledge that in education today testing equals relevance. Therefore, in order to be recognized as a mainstream, significant field, we should push for state standardized tests in technology education.

Assessment and Accountability Background

According to Linn (2000) assessment and accountability have played prominent roles in many of the education reform efforts implemented during the past 50 years. In the 1950s, testing was employed to select students for higher education and to identify students for gifted programs. By the mid-1960s test results were used as one measure to evaluate the effectiveness of Title I and other federal programs. In the 1970s and early 1980s, the minimum competency testing movement spread rapidly; 34 states instituted some sort of testing of basic skills as a graduation requirement. The late 1980s and early 1990s saw the continuation and expansion of the use of standardized test results for accountability purposes.

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With the passing of NCLB in 2001, schools are now held accountable for student achievement and must show that their students make adequate yearly progress (AYP). Schools that are unable to accomplish this task face a number of consequences. Currently, most states measure AYP through standardized tests. These are appealing to policymakers for several reasons: Testing is relatively inexpensive compared to making program changes, they can be externally mandated, they can be implemented rapidly, and they offer visible results (Linn, 2000).

Accountability refers to the premise that schools are responsible for the learning and academic achievement of all their students. Accountability is documented in a variety of ways, including summative and formative measures, standardized tests, and sometimes performance-based assessments of student learning. Accountability is not simply about reporting results; it also dictates negative and positive consequences for the results. The current educational discussion about accountability emphasizes three underlying principles: (a) that content standards serve as the basis of assessment and accountability, (b) that performance standards are used to evaluate student learning, and (c) that high-stakes consequences are tied to accountability measures for students, teachers, and schools (Linn, 2000).

Standardized Tests

Standardized tests can be categorized into two major types, norm-referenced tests and criterion-referenced tests. These two tests differ in their intended purpose, the way in which their content is selected, and their scoring process, which defines how the test results must be interpreted.

The major reason for using a norm-referenced test is to classify students. Norm-referenced tests are designed to highlight achievement differences between and among students in order to produce a dependable rank order of students across a continuum of achievement from high achievers to low achievers. School systems might want to classify students in this way so that they can place the students in appropriate remedial or gifted programs. These types of tests are also used to help teachers select students for different ability-level reading or mathematics instructional groups (Bond, 1996).

While norm-referenced tests ascertain the rank of students, criterion-referenced tests determine "...what test takers can do and what they know, not how they compare to others" (Anastasi, 1988, p. 102). Criterion-referenced tests report how well students are doing relative to a pre-determined performance level on a specified set of educational goals or outcomes included in the school, district, or state curriculum.

Test content forms an important distinction between a norm-referenced and a criterion-referenced test. The content of a norm-referenced test is selected according to how well it ranks students from high achievers to low. The content of a criterion-referenced test is focused on how well it matches the learning outcomes deemed most important. Although no test can measure everything of importance, the content selected for the criterion-referenced test is selected on the basis of its significance in the curriculum while that of the norm-referenced test is chosen by how well it discriminates among students (Bond, 1996).

Current State Assessments in Technology Education

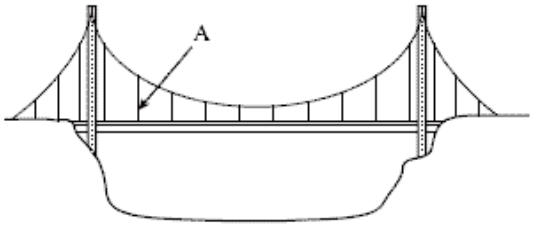
Based on a survey of the education websites of fifty states and the District of Columbia, only two states—Massachusetts and New York—have any direct assessment of technology education. The state of Kentucky also assesses technology education, but only indirectly by testing practical living and vocational skills.

The assessment of technology education in Massachusetts began with the *2001 Massachusetts Science and Technology/Engineering Curriculum Framework*. The 2001 framework, for the first time, articulated standards for full-year high school courses in technology/ engineering. The framework identified a subset of core standards for each course that were designed to serve as the basis for the Massachusetts Comprehensive Assessment System (MCAS) (Massachusetts Board of Education, 2006).

The MCAS test is a criterion-referenced test that covers the four major content areas of English/language arts, mathematics, science and technology/engineering, history and social science (Massachusetts Board of Education, 1998). The technology/engineering area is tested in grades 4, 8, and 10. The

Figure 1

The figure below shows a pictorial model of a highway bridge.



What is the primary structural action of member A?

A. compression

B. shear

C. tension

(Massachusetts Board of Education, 2005, p. 3.)

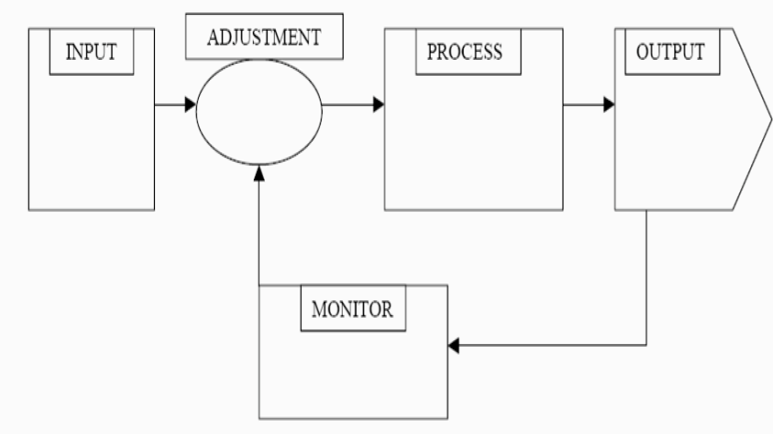
questions at each level of the engineering/technology test focus on the design process and on understanding and using technology. Key questions include items which ask, How does this work? How can this be done? How can this be done better? Figure 1 provides a sample MCAS test question.

The state of New York directly tests technology education as well. However, New York only tests at the intermediate or middle school level through program evaluation tests. The school districts of New York identified the essential knowledge covered in New York's technology education classes and the assessment is designed to help districts identify the strengths and weaknesses of their overall program. With this purpose in mind, individual student scores are evaluated to discoverer if the essential knowledge identified by the districts has been successfully taught.

Figure 2

16. The systems model is used to explain how systems work. Select one system type from the list below and use the systems model to explain it.
    - Home heating system
    - Automobile cooling
    - Residential electrical system
    - Hydroponics growing system

    System type _____
    Write in the spaces provided, the specific parts of the system you chose from the list above.



(New York State Department of Education, 2000b, p. 5.)

The New York Intermediate Assessment in Technology covers the following areas: engineering design, tools, resources and technological processes, computer technology, technological systems, history and evolution of technology, impacts of technology, and management of technology (New York Department of Education, 2000a). These areas are tested using multiple choice and short answer questions. Figure 2 shows an example of a question from the New York Intermediate

Assessment in Technology (New York Department of Education, 2000b).

Kentucky's testing system, the Commonwealth Accountability and Testing System, tests students in the seven core content areas of reading, mathematics, science, social studies, arts and humanities, practical living/vocational studies, and writing. These tests are criterion-referenced tests that are administered at various grade levels. The practical living/vocational studies areas are tested in grades 5, 8, and 10. The topics included are jobs/careers, selecting and preparing for a career, work habits, skills for success, and postsecondary opportunities (Kentucky Department of Education, 2004).

Other states that don't directly test technology education nevertheless seem to assume a level of technological literacy in their students. According to the Delaware Student Testing Program, their tests are designed to (a) serve as a measure of progress toward the Delaware content standards and (b) ensure that students can apply their academic skills to realistic, everyday problems (Delaware Department of Education, 2004).

These annual Delaware tests evaluate reading, writing, and mathematics in grades 2-10 with additional science and social studies tests administered in grades 8 and 11. While the state of Delaware tests five content areas, it does not specifically test technology education. Nevertheless, its second stated goal, to ensure that students have the ability to solve everyday, real-world problems, seems to imply an emphasis on technological literacy.

Conclusion

The International Technology Education Association's (ITEA) *Standards for Technological Literacy* defines technology as "how humans modify the world around them to meet their needs and wants, or to solve practical problems" (ITEA, 2000). To master the knowledge and ability to adapt and modify our world is what we, as technology educators, strive to teach our students. Assessing a student's grasp of this ability is difficult, but it is not impossible.

According to Benenson (2002), "the proliferation of testing is difficult to resist, and more and more classroom time is devoted

to teaching to the test" (pg. 52). Like it or not, this is the environment in which we currently teach and we must become part of it or be left behind. Starkman (2006) advocates assessment. He maintains, "There is no question that accountability and testing are here to stay…" (pg. 28). Instead of resisting state assessments, we must embrace them.

Other states should follow the lead Massachusetts and implement state-wide assessment tests in technology education. These tests should be criterion-referenced tests. However, these tests should not be tied to any high-stakes testing programs, nor should they be used for graduation requirements. States should base the tests on both the Standards for Technological Literacy as well as their current state standards for technology education.

As a profession we have choices to make. We can accept the status quo or we can change. Now is the time to advocate for change and embrace the current trend of standardized testing by insisting that our states add a criterion-referenced test in technology education. The exams would show to students, parents, teachers, and administrators what we already know, that technology education is relevant and accountable in today's educational climate.

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