Focus and Rationale

I propose, as a subject of investigation, an inquiry into the transition of Industrial Arts to Technology Education. Are the results of moving from Industrial Arts to Technology Education still producing the skilled individuals needed in a competitive 21st Century workforce?

It is my opinion that the answer to this question is important and pertinent to the profession of Technology Education, local school districts, communities, employers, employees, states, the United States of America, as well as myself. In my current position as a junior high school Technology Teacher, it seems most likely that I would be addressing the issue with other teaching staff and administrators during staff meetings. I especially envision discussing the study results with my districts' curriculum coordinator. Outside of my immediate school district other audiences that I will want to present to includes; the Technology Education professional organizations at both the state and national levels. It will be good to share my research results through the written word in professional journals such as, the Journal of Technology Studies, and the Journal of Technology Education.

I am a Technology teacher who is continuing to develop a useful and pertinent course curriculum. I feel the constant pull between two historically related but different worlds in Industrial Arts and Technology Education. I often question my lessons, hoping for the best blend of 21st Century technology and 20th Century manual arts skills. In a time where technological advancements blend with manual skills my heart is tormented by the question, "am I doing justice for my students?" The need for individuals in the workforce who are proficient in skills that blend technology with manual arts exists. Moreover, as the aging baby boomers retire, that need will more than likely exceed our ability to replace them. It is decisively important to develop to the best of our abilities the single most valuable natural resource available to us, our youth. I want to achieve this with the most practical and efficient method available. This issue needs to be addressed, and the resulting information shared with other educators.

A few sources I plan to use for my research include; Journal of Technology Education, Journal of Industrial Teacher Education, and The Journal of Technology Studies.

Literature Review

Introduction:

I propose, as a subject of investigation, an inquiry into the transition of Industrial Arts to Technology Education. The psychology of manual instruction is changing to be more contemporary, following the social and technological needs of society, thus ushering in

a new era of Technology Education. Despite the changing philosophy, is there still a need for the manual tool paradigm? Are the results of moving from Industrial Arts to Technology Education still producing the skilled individuals needed in a competitive 21st Century workforce?

Perspectives:

The opinions are many and varied when it comes to the topic of leaving traditional Industrial Arts Education in the past as the new paradigm of Technology Education continues to become the widespread educational trend in most school districts. Some professionals believe Industrial Arts Education should be reinstated, some feel it's completely outdated, and still others believe that both are necessary to instill in students the skills they will need to not only survive, but also thrive in today's market place. Patrick N. Foster reflects two of the aforementioned view points which he refers to as the "revolutionary" view and the "evolutionary" view in his article Technology Education: AKA Industrial Arts (1994).

James Howlett, former president of the California Industrial and Technology Education Association Foundation, believes Industrial Arts education is still relevant for today's classrooms. In his article, Industrial Arts: Call it what you want, the Need Still Exists, he reports, "A review by the U.S. Department of Labor reveals a comparable shortage of skilled workers in all the areas traditionally taught in the "old industrial arts" classes" (2008, p. 523). Howlett quotes Edward Gordon who expressed concern regarding the vast number of baby-boomers facing retirement and the lack of skilled workers entering the workforce, 'the United States lacks adequate numbers of appropriately skilled workers to support high standards in personal or professional services, or properly maintain the physical and technological infrastructure upon which everyone relies and takes for granted…' (2008, p. 523).

Additionally there is still a need to provide other avenues of knowledge to the sector of students who choose not to attend college. "At a time when many high school students are not planning to pursue a college degree, pressure to teach more technology in order to emphasize the college prep academic curriculum may be detrimental to the more traditional industrial arts curriculum. This is evidenced by newspaper advertisements seeking skilled help in carpentry, plumbing and maintenance with emphasis on heating and air conditioning," (1996) as stated by G. Kent Stewart, professor in the College of Education at Kansas State University.

Still there are those who hold that there is a value in blending the psychologies of Industrial Arts and Technology Education like Dennis Herschbach who states, "There are compelling educational reasons, even for woodworking. On the other hand, there are also compelling educational (not to mention vocational) reasons for de-emphasizing craft based, manipulative focus to technologies and activities that are more meaningful in today's work context" (1997, p. 24). Kenneth S. Volk, Senior Lecturer in the Department of Engineering and Technology Studies at the Hong Kong Institute of Education also believes that there is value in both disciplines. He proposes a need for

more collaboration, where character development and problem solving skills are emphasized. "It may be that both industrial arts and technology education have an obligation to prepare students in these important personal and social skills" (Volk, 1996). John Centko shares Volks' emphasis on problem solving and creative thinking skills (1998).

A third perspective encompasses professionals who believe that traditional Industrial Arts is out dated. Without ignoring the historical significance and ties Industrial Arts has in relationship to Educational Technology, the former did not evolve with changing educational trends, per Steven C. Clark who contends that, "The industrial arts curriculum is industry based. However, the current curriculum reflects the technology of years past" (1989). Litowitz and Warner also contend that Industrial Arts no longer serves current educational needs. They believe "…that contemporary technology education curricula are different from the outdated industrial arts model and represent a valuable asset in any forward-looking general education curriculum" (Litowitz, Warner, 2007).

Pedagogy

Within the transitional phase of Industrial Arts to Technology Education the manual tool paradigm has been focused, blended, and blurred into several different psychologies of use. The project method, whose history dates back to the 17th century, is the most basic of them all. This pedagogy involves the students' initial contact with the subject matter through lectures and instruction which invokes the practical application of theory within the students' project. Michael Knoll, representing the University of Bayreuth comments, "it was introduced in the curriculum so that students could learn at school to work independently and combine theory with practice" (1997).

Ausburn and Brown conducted a study which indicates the use of the Atlas assessment of learning strategies as a useful tool to improve Career and Technical Education student learning. The Atlas assessment categorizes the learners into three categories based on the individual students' preferred approach to learning. Ausburn and Brown believe their research has instructional implications for CTE educators as, "research has indicated that student achievement and motivation generally improve when instruction matches student learning styles (Gee, 1996; Wakefield, 1993)" (2006). The research contributed by Ausburn and Brown shows specific teaching techniques which enhance student learning. "These include providing CTE students with hands-on learning activities, clear explanations, multiple learning resources, active rather than passive learning, applied learning related to real life experience, meaningful learning assignments and projects, and personal rather than formal learning environments" (1996).

STEM with the integration model is a relatively new instructional method within the frame work of manual arts which encompasses the curriculum of core classes (math and science). Aaron C. Clark and Jeremy V. Ernst authors of STEM-Based Computational Modeling for Technology Education state, "As educators prepare

students to be expert thinkers in the 21st century, they must keep in mind that the study of engineering and the overall applied concepts that can come from this area can be appropriate for most students" (p.26). Applied concepts are an important constraint in manual arts as well as the STEM pedagogy as that is the realization of theory for students' character development and development of and trade skills. Ronald Rockland, Diane S. Bloom, John Carpinelli, Levelle Burr-Alexander, Linda S. Hirsch, and Howard Kimmel state, "The engineering design process can provide a context that would support teachers in teaching about scientific inquiry since these processes are directly parallel in nature and have similar problem-solving characteristics" (2010).

Assessment:

George Rogers, from the University of Nebraska, conducted a survey of Industrial Arts and Educational Technology teachers from several grade levels in order to be able to determine the specific tool aptitudes that needed to be provided by teacher educators at the baccalaureate level. The surveyed group was limited to an assortment of schools and educators found within the state of Nebraska. "The NCATE-Approved Curriculum Guides: Basic Programs in Technology Education indicate that 'the level and scope of skills in the safe and efficient use of contemporary technological tools, instruments, and machines to be acquired have been identified and incorporated into the program'" (International Technology Education Association/Counsel on Technology Teacher Education, 1992, p. 6) (Rogers, 1998). "The data further suggested that 'the ability to properly operate industrial equipment is still an essential element of industrial/technology education teacher education" (1998). This translates into the teachers ability pass on of these manual arts skills to students in secondary school.

"The purpose of this study was to begin to describe current programs and practice in technology education in the US and compare findings from this study with those of the two previous comprehensive studies of industrial arts education" (2001, p. 3). This study as well as the similar but two previous studies (from within the past 50 years) was to gain insightful knowledge into the curriculum of Industrial Arts. This knowledge was used as a litmus test to find the value of current curriculum practices in relation to the skills needed in the economic job marketplace. Survey samples were taken from both middle school and high schools. The survey being just a fraction of the entire professional membership of industrial arts was calculated to have 95 percent accuracy. The 38 question, short answer, survey was mailed to randomly selected schools or industrial arts teachers. As an incentive to increase response, self addressed stamped return envelopes were included in the mailing, as well as the prospect for winning a $100 gift certificate upon return of the completed survey. Follow up phone calls, and remittance of the survey to non responders was used to reduce the percentage of non responders. According to Sanders, "The data suggest a decided, evolutionary shift-with the legacy of industrial arts still in evidence-rather than a total transformation of the field" (2001, p. 16). Survey results show an increased importance of computer usage, though not a high percentage the amount of interdisciplinary teaching had increased with a reduction of emphasis on leisure time activities and interests (wood working).

The purpose of Anthony R. Korwins' and Ronald E. Jones' research, Do Hand-On, Technology-Based Activities Enhance Learning by Reinforcing Cognitive Knowledge and Retention, "…was to determine if hands-on technology-based activities enhance learning among eighth grade students by reinforcing cognitive knowledge and improving retention" (1990). "'In their research, Boothby and Alverman (1984) found that visuals, used in conjunction with lecture material, increased comprehension and retention of information'" (1990). The authors of this study devised two separate objectives and lesson plans, each for a distinctly different teaching environment. They selected 4 different math and industrial arts classes to participate in their survey which ultimately created a sample size of 50 students. One instructor taught 2 different lessons over the same material to 2 different classes. One class was strictly a lecture class while the other combined lecture and visual aid material. A test after the lessons were given to the sample section of the 8th grade student body to determine the amount of comprehension and retention. Test questions were designed to so that in depth thinking would be required to answer them. Test results confirmed that hands-on activities do in fact help students retain and comprehend course material over lectures alone. The test results also suggest that industrial arts / technology education have a strong foundation in the manual tools model.

Conclusion:

Upon reflection of the research I have viewed in preparation for my own study I have gained a refined understanding of the benefits of both Industrial Arts and Technology Education. My training and passion has always been with traditional Industrial Arts, however I now see value added with a contemporary blend from both. That blend takes the key elements of both curriculums and combines them in a way that enables learners to increase their skill and knowledge in order to meet the demanding higher order skills necessary to compete in the market place of the 21st century.

While my opinion is changing, I still must maintain an unbiased atmosphere within all aspects of my survey so as to not taint the results. I will limit my search to the State of Ohio because the survey sample of a single school district or even all districts within a county is too small to do justice. Small, confined areas will tend to have the same thought processes. To encompass a larger cross section of Industrial Arts and Technology Education classes on a state level allow for a much better sampling of course curriculum. Of course on a larger scale a higher percentage of accuracy for sample participants will be harder to maintain due to physical distance and numbers. Perhaps a random drawing of 1 or 2 school districts from each county could be used. Sample participation could be encouraged by the vast means of communication available to us such as email, postal mail, and phone calls. Participation could also be increased or maintained at a higher level with the use of a gimmick like give-aways (gift cards).

Research and Design

Research Questions*:*

Is there still a need for the manual tool paradigm to be taught in current educational programs?

Is Industrial Arts still a valuable part of Ohio's educational system?

Procedures:

The objective of this study is to determine the need, if any, for continued teaching of the manual tool paradigm. In order to find that answer this study must look beyond the halls of education to the work world, specifically those areas of employment that require skill in manual trades; the service industry, manufacturing, and the building trades. Furthermore research participants will range from managers of the afore mentioned industries, to high school graduates who did not follow the college preparatory track. The survey sampling will be a random across the State of Ohio. As the scope of the survey is large, the survey sample will be determined by an outside group, who has the expertise and resources necessary to create a random sampling from a large pool of potential participants, such as the Market Data Retrieval Company.

The surveys will be sent via the United States Postal Service. Included with each survey will be a self addressed, stamped envelope for participants to return completed surveys to help encourage participation and reduce the amount of non responses. Included on a separate sheet with instructions will be a short note stating that all completed and returned surveys will be placed in a drawing for the potential to win a gift card. This gimmick is hoped to also reduce the amount of non respondents. One week after mailing, non respondents will be mailed a second copy of the survey with a phone call as a gentle reminder and encouragement to complete the survey. The importance of limiting the amount of non respondents is high so the survey's percent of accuracy also remains high.

Assessment:

To assess the research participants this study will be using a survey. Survey questions will be designed to avoid answers that yield a repetition of facts as the purpose of the study is not to determine how much or what people know but how much a set of skills is used. The survey questions and answers must reflect manual skill needs and volume of those needs based upon experience from the work force in Ohio.

Two separate surveys will be created. One survey will be geared towards determining the manual skills needed in the work place from the vantage point of the management professionals the study is collecting data from. I will refer to this survey as survey "A". The second survey will be geared towards determining the manual skills needed by the laborers in the workforce who would potentially use those skills. This will be called survey "B". Segregating the survey sample and developing surveys specific to work force vantage point is designed so as to include two different educational conditions; on the job training of needed skills, and school based training of needed skills. Including both conditions in the survey will provide a much more accurate measure of the educational needs in an Industrial Arts / Technology Education setting.

After the initial surveys have been crafted, a panel of professionals; two Industrial Arts Teachers, two research specialists, and two representatives from industry, will review the documents and provide survey revision suggestions.

The survey will use a 3 point Likert Scale; 1 – Never, 2 – Sometimes, 3 – Often. Even though the answers to survey questions are qualitative, the Likert Scale will convert that data into quantitative data by finding the mean score the answer set for each question. This conversion of data will be more easily analyzed when forming final conclusions.

Final tabulation of mean scores will be displayed by way of a bar graph where results will be analyzed. Final survey results from surveys A and B will be compared for trends and similarities to help form a conclusion for the survey. Statistically higher trends of affirmative answers will show an elevated use of manual tool skills used in the workforce, while the opposite, statistically higher trends of negative survey answers, will depict a lesser need for manual tool skills in the work force. The conclusion will show the need or lack thereof for continued teaching of the manual tool paradigm in the education of Ohio students.

Design Rationale:

The plan of action for this study is well suited to yield good data for my research questions. Due to the large volume of survey participants a survey questionnaire is best suited to gather information in a short amount of time. This method is less threatening, time consuming (for both survey participants and survey administrators), and costly than observation and interview methods of data collection. I anticipate survey participants being more likely to complete a short survey. Though the potential for non responses is higher with an impersonal mailed survey, I have built in several methods to counter that with resending the mailer as well as follow phone calls. Given the large volume of participants that will be surveyed across the State of Ohio, other methods of data collection will require too many human, and capitol inputs to be cost and time efficient. A smaller sampling size contained to a much smaller geographical area would detract

from the degree of accuracy that is hoped to be obtained with this survey. This data collection tool (survey) is designed to be clear and concise through multiple revisions for both the survey administrators and survey participants in order to achieve the most accurate data sampling.

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Ausburn, L., Brown D. (2006). Learning strategy patterns and instructional preferences of career and technical education students [Electronic version]. *Journal of Industrial Teacher Education*, *43*.

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continued strength, relevance and value [Electronic version]. *Journal of Technology Education, 8*.

Appendix

Ausburn, L., Brown D. (2006). Learning strategy patterns and instructional preferences of career and technical education students [Electronic version]. *Journal of Industrial Teacher Education*, *43*.
Lynna J. Ausburn and Dovie Brown, both representing Oklahoma State University, purpose this study to show and explain different learning strategies associated with Career and Technical Education. The results of their work serve as a stepping stone to engage further research, insight and discussion in terms of advancing Career and Technical Education in such a way as to benefit contemporary learners.

Centko, J. (1998) Addressing the humanistic side of workforce education [Electronic version]. *Journal of Industrial Teacher Education, 35*.
In this commentary, John Centko of Illinois State University, shares what humanistic skills he believes employers need from their workforce. Furthermore, Centko feels a place in K-12 curriculum should be developed which will allow the teaching of those skills to future generations who will be joining the workforce. The importance of this is to be able to stay competitive as employees and businesses in the global economy.

Clark, A., Ernst, J. (n.d.) STEM-based computational modeling for technology education [Electronic version]. *The Journal of Technology Studies*. Retrieved July 24, 2011. From http://scholar.lib.vt.edu/ejournals/JOTS/v34/v34n1/clark.html
In this article, authors Aaron C Clark and Jeremy V. Ernst share their view of where they believe Technology Education is headed over the next ten years. The authors propose focusing on a national Technology Education curriculum, highlighting STEM education that would include engineering, design, and computational science, which in turn would develop in students two central skills believed to be necessary for the United States to remain globally competitive in the 21st Century, expert thinking and complex communication. The article reports data found while implementing a new STEM companion model with at-risk high school students in North Carolina.

Clark, S. (1989). The industrial arts paradigm: Adjustment, replacement, or extinction? [Electronic version]. *Journal of Technology Education, 1*.
Steven Clark writes about the transition of Industrial Arts to Technology Education. He states that in many cases the name has changed but the curriculum has not in a field which has seen little advancement in education for more than 70 years. The author believes that Technology Education brings to students the skills needed to compete in the workforce no matter what their individual interests are.

Foster, P. (1994). Technology education: AKA industrial arts [Electronic version]. *Journal of Technology Education, 5*.

Patrick N. Foster writes about three different stances individuals can take when considering Technology Education, “revolutionary”, “evolutionary”, and the viewpoint that little change has occurred in the philosophy of Technology Education and Industrial Arts. He continues to describe, in detail, how Industrial Arts and Educational Technology relate or tie into each of those theories. Furthermore, the article establishes the need to purposefully continue the change from Industrial Arts to Educational Technology while not belittling the value and foundation formed by Industrial Arts.

Hansen, J., Lovedahl, G. (2004) Developing technology teachers: Questioning the industrial tool model [Electronic version]. ***Journal of Technology Education., 15*****.**
Hansen and Lovedahl note the confusion in defining clear purposes for both Industrial Arts and Technology Education. It seems the preparation of Technology Education teachers at the baccalaureate level increases this confusion by continuing to use the industrial tool model as the basis of their teacher training. With no uniformity or clear direction within course curriculums, those in the Industrial Arts and Educational Technology fields are in a place of limbo, having no real direction. The authors present a plan for improving the way technology teachers are trained.

Herschbach, D. (n.d.). From industrial arts to technology education: The eclipse of purpose. Retrieved July 24, 2011, from http://www.akademik.unsri.ac.id/download/journal/files/scholar/4-Hershbach.pdf
Dr. Herschbach is an associate professor in the Department of Education Policy, Planning, and Administration at the University of Maryland. This is the final article in a three-part series that depicts the relationship between Industrial Arts and Educational Technology. Herschbach provides a detailed description and timeline of the evolution of Industrial Arts into Educational Technology from the 1980’s through the 1990’s, illuminating key societal and governmental stimuli which has directed the evolution of curriculum and psychology.

Howlett, J. (n.d.) Industrial arts: Call it what you want, the need still exists. ***PHI DELTA KAPPAN*****. Retrieved July 24,2011, from http://wed.siu.edu/faculty/CSims/560/Industrial%20Arts%20Call%20It%20What%20You%20Want.pdf**
James Howlett’s article is a rebuttal to an article written by Len Litowitz and Scott Warner which refutes the need for Industrial Arts and the teaching of manual skills in today’s education system. Howlett contends that Technology Education will not fulfill the needs for skilled workers in the marketplace.

Jones, R., Korwin, A. (1990) Do hands-on, technology-based activities enhance learning by reinforcing cognitive knowledge and retention? [Electronic version]. ***Journal of Technology Education. 1*****.**
The research in this article by Anthony R. Korwin and Ronald E. Jones attempts to determine if hands-on learning actually increases students’ retention and knowledge.

The conclusion of this study, based on the effectiveness of the experiment, shows a direct correlation between learning and hands-on activities that replicate the key components of a lesson.

Knoll, M. (1997) The project method: Its vocational education origin and international development [Electronic version]. ***Journal of Industrial Teacher Education, 34*****.**
This 1997 article written by Michael Knoll of the University of Bayreuth, speaks to the history of the project method, spanning multiple countries and time periods. He stresses the importance of integrating contemporary educational reform within its historical contextHe explains how the project method is designed to help students learn to combine theory with practice, and to work independently.

Litowiz, L., Warner, S. (2008) Technology education: A contemporary perspective. ***PHI DELTA KAPPAN*****. Retrieved July 25, 2011, from** **http://wed.siu.edu/faculty/CSims/560/Technology%20Education%20Contemporary%20Perspective.pdf**
This article was written in response to ideas expressed in Howlett and Huff's, Industrial Arts/Technology: What are We Doing? Although Litowitz and Warner agree with two key points made by Howlett and Huff, their agreement ends there. They contend that Industrial Arts is archaic and that in a world that is ever increasingly technologically based, preparing students in this area of study is a necessity.

Rogers, G. (1998) Concerns about technology education laboratories [Electronic version]. ***Journal of Industrial Teacher Education, 35*****.**
This commentary, written by George Rogers from the University of Nebraska, warns ot the issues concerning the use of modules and the inconsistencies between teacher training and the needs of the educational system.

Sanders, M. (2001). New paradigm or old wine? The status of technology education practice in the United States [Electronic version]. ***Journal of Technology Education. 12*****.**
Mark Sanders, who is a faculty member in the Technology Education program at Virginia Polytechnic Institute and State University, created this study to be used as a litmus test to ascertain the current status of the change from Industrial Arts to Technology Education. Sanders expresses his concern that the curriculum of Technology Education is really the same as that of Industrial Arts, simply under the guise of a new name. He contends that the lack of worthwhile communication within the two professions has hampered the transition, increasing the sense of confusion regarding Technology Educaiton.

Stewart, G. (1996). In with the new, but not out with the old [Electronic version]. ***Vocational Educational Journal, 71,*** **62.**
In his article, In With The New, But Not Out With The Old, G. Kent Stewart reports on the need in the workforce for people with the skills necessary to manipulate tools and materials. G. Kent Stewart is a professor in the College of Education at Kansas State

University. Stewart holds degrees in Industrial Arts, Vocational Trade and Industry Education and Educational Leadership. Stewart stresses the necessity of finding balance in Technology Education where both vocational aptitude as well as college preparation technology aptitudes can be taught. He states this balance is necessary due to the importance of maintaining a workforce that can manage both.

Volk, K. (1996). Industrial arts revisited: An examination of the subject's continued strength, relevance and value [Electronic version]. ***Journal of Technology Education, 8*****.**

Kenneth Volk presents an interesting vantage point as he highlights the pros and cons of Industrial Arts from the perspective of Technology proponents. Throughout this article, a new view takes shape, showing Volk's belief that there is a need to blend both Industrial Arts and Technology. At the same time, it shows how no one subject has the ability to encompass all educational needs.