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A Study to Determine the Need to Include Technology Education as a Required Part of General Education and its Effectiveness in Preparing Students for Trade and Industrial Courses

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A STUDY TO DETERMINE THE NEED TO INCLUDE TECHNOLOGY EDUCATION AS A REQUIRED PART OF GENERAL EDUCATION AND ITS EFFECTIVENESS IN PREPARING STUDENTS FOR TRADE AND INDUSTRIAL COURSES

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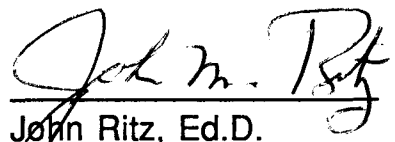

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Shon M. Walter

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CHAPTER I

INTRODUCTION

Technology Education is a vital part of the education of all students and should not be limited to an elective group of learners. When course selection is administered for basic credit requirements, consideration should be given to technology and its applications to all aspects of education. "The application of knowledge, tools, and skills to solve practical problems and extend human capabilities" (Johnson, 1989, p. 1) does not limit itself to include only technology education.

The advent of technology education in replacing industrial arts classes has made vast improvements in offering a more up to date course of study for high school students. However, with the inclusion of high tech applications, basic tool skills and a good work ethic remain desired traits by employers. "With the coming of the industrial revolution in the late 1800s and early 1900s it became increasingly clear that people needed to become familiar with the technology of the times in order to cope with it, and to adapt to new technology in order to become productive in the workplace" (Pucel, 1992, p. 3). The same philosophy should hold true today.

Trade and Industrial courses are another alternative to

providing technical skills. They are offered at the high school level and have remained basically the same, in that they strive to offer students basic job skills for employment in the work place. Today we have two subjects in place, trade and industrial, which prepares students for their place in trade related jobs, and technology courses which provide for the reinforcement of academic skills in an applied learning environment.

Both of these subjects are available to high school students in public school systems. Both remain electives in the school systems as they strive to find their place in general education. "Chaos and conflict certainly describe the current status of technology curricula" (Rudisill, 1987, p. 7) as they relate to the general education of today's youth.

STATEMENT OF THE PROBLEM

The problem of the study was to determine the need to include technology education as a required part of general education for all students to assist them in applying and learning academics and to serve as a basis for preparing them for Trade and Industrial courses.

RESEARCH GOALS

The following goals were studied in order to determine the need to include technology education as a part of general education for all students.

1. Does technology education offer applicable skills needed by all students?
2. Are the technology courses in high school primarily preparing students who are continuing in technical education (i.e., Tech Prep, School to Work Transitions, etc.)?
3. Do you see Tech Prep as moving in the right direction toward student preparation for the work place?
4. Do technology classes help non college bound students prepare for the work place?
5. Should technology classes be required for all students at the high school level?

BACKGROUND AND SIGNIFICANCE

As our society moves toward a higher technological base, the needs for the general education curriculum at the secondary level

have changed. When more information is included in a course of study something must inevitably be left out. In technology education, due to the move toward high technology, the content which has been left out are the technical skills in processing materials, as they related to the old industrial arts type of program. Now that tool skills are no longer a major part of technology education, and have been replaced by a much broader base as relates to technical applications, these new or high tech applications effect all students as they prepare to enter the workplace.

In the many fields that comprise technical applications, the preparation of all students for these types of jobs would appear obvious. Whether a student is pursuing a business degree, or a two year technical program, the basic need for applied skills remains the same. "Technology education will not be able to justify a position in the school curriculum by doing what it has done in the past better" (Pucel, 1992, p. 27).

Technology education has met the challenge. Changes have been put in place that include the skills students need in order to prepare them for the future. Emphasis has been placed on those skills such as problem solving, planning, and design. Today technology education

needs to become a required part of the education of all students.

Traditionally, technology education courses have been a dumping ground for students who have been determined incapable of fulfilling the requirements and the rigors of academic course work. Technology courses, because of the overlap into academic courses, can cause a renewed interest in the study of such areas as science, math, English and history due to the applied nature of the technology courses. Technology education classes pay homage to all of these disciplines and should not be isolated from those courses in which they are related. "Any real change will require that individuals...quit worrying about protecting...turf and start focusing on common goals" (Gray, 1992, p. 23).

LIMITATIONS

Interviews will be conducted with assistant principals, guidance counselors, school security and disciplinarians in the Norfolk, Virginia, public school system. An interview with the principal at the Norfolk Technical Vocational Center (NTVC) will also be conducted to determine the effectiveness of student preparation for trade and industrial courses. The study will be

limited to technology courses as a requirement for all students, and to determine if technology education prepares students for additional trade and industrial courses.

ASSUMPTIONS

With so many technical requirements for all occupations, all students would benefit from technology courses. These courses provide students with the background knowledge in tool usage, machines and equipment operation, technical drawing, blueprint reading, computer applications, and electronics, as well as problem solving, planning, and design. All of these skills can be applied to a variety of academic courses.

The knowledge gained through technology courses can be applied to mathematics, science, English and history. Technology is everywhere in our society, and students will benefit from basic courses covering the foundations of technology.

PROCEDURES

Using a series of questions relating to student course selection, students with a technology education background, and

vocational education requirements, interviews were conducted with assistant principals, guidance counselors, school security, disciplinarians, and the principal at NTVC. The interviews were conducted at their respective schools during the months of February and March 1996, in the City of Norfolk, Virginia and data was collected from the responses that were returned by mail. It was from these interviews and mailed responses that the information was gathered, analyzed and conclusions were formed.

DEFINITION OF TERMS

The following words/phrases are referred to throughout the study and are defined as follows:

1. Technology Education - Applied courses that use science and engineering as the basis for content. These are offered at the high school level, to include such courses as Electronics, Materials and Processing, Drafting, and Communications.
2. Vocational Education - High school level job skill training for a specific trade.
3. Trade and Industrial - Job training courses that are

geared toward mechanics, machines and equipment.

4. Industrial Arts - The curriculum of study that was replaced by Technology Education. Its main emphasis was on hand tools, materials processing and the construction of projects.

5. Norfolk Public Schools - The public school system in the City of Norfolk, Virginia. The interviews conducted were done at the following High Schools in the city: Granby High School, Lake Taylor High School, Booker T. Washington High School, Norview High School, Maury High School, and Norfolk Technical Vocational Center (NTVC).

OVERVIEW OF CHAPTERS

In Chapter I, the basis for this study was discussed. This included the goals of the study, background and significance, limitations, assumptions, procedures and definition of terms.

Chapter II includes information gathered from literature on Technology Education, Industrial Arts, and Trade and Industrial Education to form a background for the study. Chapter III provides details on the methods and procedures used during the interviews to

gather information needed to meet the goals of the study. Chapter IV is a report on the findings. This included the analysis of information gathered through the interviews. Chapter V includes a summary and conclusions of the data based on the findings from the interviews. Recommendations are made for future studies and for counselors and teachers in relation to the addition of technology courses as a requirement for all students.

CHAPTER II

REVIEW OF LITERATURE

One of the goals of public education has been to provide all students with the basic literacy skills through such courses as mathematics, English and science. As society changes so should the courses that we teach. With the ever increasing application of technology and its over lap with courses such as mathematics, English and science, the integration of these academic courses has never been more needed.

It is due to this increase of technical applications and their degree of relationship to academic courses that technology courses should become part of the required curriculum for all students. In this chapter information is presented on technology and liberal arts, technology education preparing students for the world, technical applications in academics, technology courses, technology teacher opinions and a summary.

TECHNOLOGY AND LIBERAL ARTS

As English, mathematics and science courses prepare students for real world situations, the need for technology education to be a part of that preparation grows. Technology education has many

overlapping elements with academic courses. Mathematics courses prepare students for the skills needed for everyday life. In society today, technology has become a part of the real world experience.

The applied nature of technology courses, for example, hands on projects and application of the visual arts, increases a students interest in learning. With the advent of computers, technology provides real world situations and applies them to academics. "Real problems - the products of technology - provide numerous exciting applications of mathematics and science ... when technology is used to introduce scientific thinking, it will appeal to the student as more interesting and relevant, and hence be a motivator" (National Science Board, 1983, p. 73).

One of the problems with technology education is that it is only offered as an elective in most schools. Technology courses have become a requirement in some states such as Maryland, New York, and Massachusetts. Other states are working toward making technology courses a part of the requirement. Since these courses are electives in most areas, technology teachers must be concerned with the numbers of students in their classes. If the course is too difficult, or requires the student to spend too much time outside of

class in preparation, the enrollment will go down.

If technology education was more clearly defined, and its goals clearly stated, the use of academics in technology education would be recognized. This would allow some academic credit from technology courses to be applied toward graduation requirements.

"There are very few (if any) aspects of human existence, advancement or prosperity that are not impacted or influenced by technology. Yet the most unbelievable paradox at this point in the twentieth century is the fact that the educational establishment has chosen to ignore a systematic study of it" (Maley, 1995, p. 1).

TECHNOLOGY EDUCATION PREPARING STUDENTS FOR THE WORLD

When students enter most technology classes, they fail to realize how much of what they have already learned will be utilized throughout the course. Measurement, basic technical drawing, materials and processing, and social and environmental concerns are all part of technology courses. However, before students enter a technology class they should complete a prerequisite course that prepares them for the basics taught in technology. There are many overlapping sections in technology classes such as measurement,

basic drawing, and an understanding of basic mathematics. The course Principles of Technology requires that students pass algebra, due to the math requirements which are necessary to complete the experiments in this course.

A prerequisite course should include, for example, measurement, basic drawing, basic electricity, and materials and processing, in addition to math requirements such as the one required for Principles of Technology. The use of flow charts, the concept of design, and systems utilization should all be basic knowledge for entry level into technology courses. With an understanding of such basics as simple mathematics and linear measurement, students would be better prepared for the problem solving, planning, and design problems that are found in technology classes.

TECHNICAL APPLICATIONS IN ACADEMICS

Technology and its relation to academics is not limited to electronic devices, and their manipulation to achieve data. "More disturbing still is the current inclination to equate technology with computers" (Boyer, 1983, p. 111). The foundations taught in

technology courses are deeply rooted in academics. The department of Technology and Society at SUNY - Stony Brook describes "application of science concepts, and applied math: quantitative methods" (Wiens, 1995, p. 139), as two of their five areas in their knowledge base, in order to develop courses to achieve technological literacy.

Technology and liberal arts courses should go hand in hand through a student's high school education. "The technology education laboratory, along with the nature of activities associated with it, is the most appropriate setting in the school for such an integrating function to take place. It is a setting wherein the areas of science, mathematics, social studies, environmental studies, history, geography and philosophy can find relevance and meaning in a context that brings the world into the school and takes the school out into the world" (Technology Education Advisory Council, 1988, p. 11).

TECHNOLOGY COURSES

The following are several examples of technology courses and a sampling of their course content. Principles of Technology is a

course that requires students to have one year of algebra. It is divided into four segments which include: mechanical systems, fluid systems, electrical systems, and thermal systems. The course relies heavily on applied mathematics as related to stress measurement, understanding vectors, and pressure measurement. Scientific notation is used and needs to be understood by students. These are some of the math and science applications in Principles of Technology.

Communication Technology uses knowledge, tools, and skills to communicate. The study of the integration of computers in graphic arts and communication gives students an applied aspect to how design work is done. Desktop publishing, electronic media, and telecommunication provides for an understanding of computers and their relation to the communications field. Learning experiences include the study of technical developments in radio, television, offset printing, and photography.

Materials and Processing uses many forms of basic mathematics. Geometry, linear, and volume calculations are used in planning and designing a product which will be produced. The use of flow charts, computer numerical control (CNC) and systems

utilization in manufacturing are studied to give the student an understanding of the manufacturing field. Automated processes and analysis for testing natural and synthetic materials is also studied due to the differences in materials handling.

Architectural, Technical, and Engineering Drawing courses use graphic and technical language utilized by surveyors, engineers, manufacturers, technicians, designers, and architects. Students also use resource materials and code books that adhere to established standards for drafting. Geometry, linear, proportional, volume and percentage problems are dealt with in these courses.

As the above descriptions show technology courses are closely related to academic courses, and they play heavily in the completion of school activities such as the school newspaper, the school literary magazine, model building clubs, and theater productions. These activities and many more rely on the capabilities of technology students. The layout of the school newspaper, the construction of stage props, and the use of lab facilities associated with technology classes are utilized by various departments in our public schools.

TECHNOLOGY TEACHER OPINIONS

How do technology teachers view themselves in the academic setting? Most technology teachers, due to the varied components in technology education, have a different view of academics and how they are applied in their courses. "Technology educators do have a perspective on technology that is often different from that of educators from other disciplines, one that is based on the familiarity of practice. This perspective is important and often underrepresented by other educators. The technology education profession has an important role to play in influencing the content of liberal education courses and providing leadership in their development, acceptance, and instruction" (Wiens, 1995, p. 138).

Technology education teacher preparation should also include liberal arts courses as part of the integration of "sociology, psychology, political science, economics, science, mathematics, ethics, and environmental studies" (Wiens, 1995, p. 143). "The study of the interdisciplinary nature of technology and technology decision making, however, requires new courses in most teacher preparation programs. The ideal course would be team taught or would feature

presentations by representatives from appropriate liberal arts areas" (Wiens, 1995, p. 143).

SUMMARY

As society moves toward a more technological base, the educational community needs to take the necessary steps to include technology education as part of the required courses at the high school level. The applied nature of technology education, and its overlap into liberal arts courses, makes it the perfect compliment to a high school education. With all of the technical applications in our everyday lives, students can only benefit from the basic knowledge these courses have to offer.

CHAPTER III

METHODS AND PROCEDURES

To gather the information needed to answer the problem of this study, interviews were conducted with administrators and questionnaires were sent to school security, disciplinarians, and the principal at NTVC. Included in this chapter is a description of the population, instrument design, methods of data collection, statistical analysis and summary.

POPULATION

The administrators, school security, school disciplinarians of the five city high schools, and the principal at the Norfolk Technical Vocational Center were the population of the study. The schools include: Maury High School, Norview High School, Booker T. Washington High School, Granby High School, Lake Taylor High School, and NTVC. The administrator involved in scheduling was interviewed when possible, as well as the principal for each school. The total population for this study was twelve people.

INSTRUMENT DESIGN

A list of schools surveyed, Appendix A, a cover letter,

Appendix B, including the purpose of the study was sent to each person to be interviewed and a questionnaire, Appendix C. The responses were presented as a descriptive research study. An area for open ended comments was included to allow an in depth response from each person.

METHODS OF DATA COLLECTION

Interviews were conducted and questionnaires were sent that included a series of questions and answers from each person and put into usable form. The data was analyzed using the frequency of response method. Results of each question are presented in Chapter IV. Explanations pertaining to each question are included in Chapter IV as they relate to the research goals.

SUMMARY

The interviews were conducted with the administrators, school security, school disciplinarians, and the principal at NTVC. Data was also collected from the mailed responses. The results are reported in Chapter IV. Due to the size of the Norfolk Public School district, the results should be representative of most major school districts. A series of questions were used to make data collection

easier. The space for individual comments at the end of the study allowed for personal responses.

CHAPTER IV

FINDINGS

The problem of the study was to determine the need to include technology education as a required part of general education for all students and its effectiveness in preparing students for trade and industrial courses. In this chapter are the results of the questions mailed to the administrators in the City of Norfolk, Virginia.

OVERVIEW OF RESPONSES

During June 1996 a series of questions were sent to the administrators at the five high schools in the City of Norfolk Virginia. A response was received from each high school. These questions enabled the respondents to add personal comments to clarify their answers if they chose. Not all respondents gave in depth answers; some were simply yes or no.

SCHOOLS SURVEYED

The administrators from the following high schools in the City of Norfolk were surveyed for the purposes of this study: Granby High School, Lake Taylor High School, Booker T. Washington High School,

Norview High School, Maury High School, and Norfolk Technical Vocational Center (NTVC).

RESPONSE FOR QUESTION I

Question I - Does technology education offer applicable skills needed by all students?

All respondents agreed that technology classes help prepare students for academic classes. One respondent indicated the need for a continuation in concentrating on the need for application skills in technology education and not use the basis for technology courses as lecture courses. Another respondent maintained the need to continue to show the transference of skills between academic and technology classes.

RESPONSE FOR QUESTION 2

Question 2 - Are the technology courses in high school primarily preparing students who are continuing in technical education?

The response to this question varied greatly in that there was no clear view point. One respondent answered the question by stating that Tech Prep has helped with the consistency in the technical and

academic tie in. Another response was that the counseling department was supportive toward the Vocational and Technical Trades.

Most responses stated that the counseling department was supportive toward technology. The most interesting response was one who stated "not sure."

RESPONSE FOR QUESTION 3

Question 3 - Do you see Tech Prep as moving in the right direction toward student preparation for the work place?

All respondents agreed with this question. One respondent stated that it was the only way to go.

RESPONSE TO QUESTION 4

Question 4 - Do technology classes help non-college bound students prepare for the work place?

All respondents agreed with this statement with emphasis placed on the continuation of hands-on type skills.

RESPONSE TO QUESTION 5

Question 5 - Should technology classes be required for all students at the high school level?

The majority of respondents agreed with this statement. Some answered the question with no, and gave no explanation. One respondent who answered yes also went on to say that all honor roll students should take technology classes as well. Several respondents agreed with the question and stated that "technology should be a part of every subject and not necessarily be a separate subject." Another stated that their major concern was with marketable skills regardless of the course as it related to technology.

SUMMARY

Responses to the questions reflect a trend toward requiring technology classes for all students. Several respondents did not see technology classes as a requirement for students in high school. Their concern was placed on the ability of the teachers, the type of courses and their relation to academic classes.

CHAPTER V

SUMMARY, CONCLUSIONS AND, RECOMMENDATIONS

SUMMARY

This study was undertaken to show that technology classes should be required for all students at the high school level. Interviews were conducted and questions were sent to the administrators in the City of Norfolk, Virginia, at the five high schools. Five research goals were established to determine how administrators in the City of Norfolk felt about making technology courses a requirement. The questions were: 1. Does technology education offer applicable skills needed by all students? 2. Are the technology courses in high school primarily preparing students who are continuing on to trade and industrial school or further technical education (i.e., Tech Prep, School to Work Transitions, etc.)? 3. Do guidance counselors see technology courses as an asset to overall student performance? 4. Does technology education provide meaningful education for students with discipline problems? 5. Should technology classes be required for all students at the high school level?

Administrators at the five high schools in the City of Norfolk Virginia were chosen because the Norfolk Public School system is where the proposal would be made.

After receiving the completed responses, the answers were grouped in like order and summarized. Some answers yielded short responses and are explained as such; others were simple yes or no responses.

CONCLUSIONS

Goal 1. Does technology education offer applicable skills needed by all students?"

All respondents agreed that technology classes helped prepare students for academic classes. One respondent indicated the need for a continuation in concentrating on the need for application skills in technology education, and not use the basis for technology courses as lecture courses. Another respondent maintained the need to continue to show the transference of skills between academic and technology classes.

Goal 2. Are technology courses in high school primarily preparing students who are continuing in technical education? (i.e., Tech Prep, School to Work Transitions, etc.).

The response to this question varied greatly. One respondent answered the question by stating that tech prep has helped with the consistency in the technical and academic tie in. Another response was that the counseling department was supportive toward the vocational and technical trades. Most responses stated that the counseling department was supportive toward technology. The most interesting response was one that answered with "not sure."

Goal 3. Do you see Tech Prep as moving in the right direction toward student preparation for the work place?

Most respondents provided short answers to this question. Their answers were basically the same in that they focused around the skills of the individual teacher and their skills to keep the students involved in the class. Answers Focused on what the teacher had to offer as experience in the work place and how they related that experience to the students.

Goal 4. Do technology classes help non college bound students prepare for the work place?

All respondents agreed that technology classes helped prepare non college bound students. The hands-on nature of the courses and their relation to business and industry prepares students for the

work place.

Goal 5. Should technology classes be required for all students at the high school level?

Several respondents stated that "technology should be a part of every subject and not necessarily be a separate subject." If all subjects utilized technology, there would not be the separation that exists now. Only one respondent disagreed that technology courses should be a requirement; all other reponses were positive.

If in the City of Norfolk there is strong support to make technology a part of all education, why is it not implemented? One reason is the stigma that is attached to technology education. It is still perceived as a dumping ground for those who are not college bound. Technology teachers still have to recruit students into their classes. Technology classes are electives and if the course content is too difficult, students will not enroll in these classes. It is also evident that administrators are concerned with the hands-on roll of technology courses and that they are not made to be lecture classes. Another main concern was the tie in between technology and academics.

Technology classes are an excellent source of information for

all students. The similarities between what is learned in a technology class and an academic class are vast and should be brought to the fore front of all education. By requiring all students to take technology classes, the City of Norfolk would be at the cutting edge of college preparation and job training, and better prepare students for the work place.

RECOMMENDATIONS

Based on the questions mailed and the interviews conducted with the administrators of the five high schools in the City of Norfolk, the following recommendations are made in view of the opinions expressed by the administrators:

1. Continue to expand the technology curriculum to include content that ties it to academic courses.
2. Improve the image of technology education so as to encourage more enrollment in the existing classes.
3. Make technology classes a requirement for all students at the high school level.
4. Research the possibilities of requiring technology classes for all high school students.

BIBLIOGRAPHY

BOOKS

Dr. G. Eugene Martin, editor, Foundations of Technology Education, 1995.

Dr. G. Eugene Martin, editor, Foundations of Technology Education, Maley, p. 1, 1995.

Dr. G. Eugene Martin, editor, Foundations of Technology Education, Wiens, p. 138, p. 139, p. 143, 1995.

Boyer, E.L. "High School: A report on secondary education in America". The Carnegie Foundation for the advancement of teaching, 1983.

National Science Board, "Commission on Precollege Education in mathematics, science & technology". Educating Americans for the 21st Century, 1983.

PERIODICALS

Technology Education Advisory Council, "The curricular role of technology education" Technology A National Imperative, 1988.

Gray, B. "Voices of Change", Vocational Education Journal, 67 (7), 1992, p. 23.

Johnson, Ron. "Vocational qualifications in the member states of the European Community and moves towards an open market", NCVQ R&D No. 2 Towards 1992. A Research Paper, 1989.

Pucel, David J. "Technology Education: Its changing role within General Education". A Research Paper, 6 December 1992 p. 27.

Rudisill, Alvin E. "Technology Curricula: Chaos and Conflict". Journal of Industrial Teacher Education. Spring 1987, p. 7.

APPENDIX A

LIST OF SCHOOLS SURVEYED

GRANBY HIGH SCHOOL

LAKE TAYLOR HIGH SCHOOL

NORVIEW HIGH SCHOOL

MAURY HIGH SCHOOL

BOOKER T. WASHINGTON HIGH SCHOOL

NORFOLK TECHNICAL VOCATIONAL CENTER

APPENDIX B

Shon M. Walter
P.O. Box 416
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June 24, 1996

Dear Colleague,

I am currently a technology teacher at Granby High School in Norfolk Virginia. I am doing a study to indicate how administrators feel about technology education and the roll it has in general education and the over lap into liberal arts education.

My goal is to determine whether technology education should be a part of all education and be required for all students.

I ask for your honest feelings on the questions. The information collected will be used as part of my thesis. Only administrators in the City of Norfolk are being questioned so your response is very important to me. A copy of the thesis will be sent to the State Department of Education in Richmond.

Thank you for your time in completing the survey and have a wonderful summer.

Sincerely,

Shon M. Walter

Enclosures:
1) Questions
2) SASE

APPENDIX C

QUESTIONS

1. Does technology education offer applicable skills needed by all students?
2. Are the technology courses offered in the high school primarily preparing students who are continuing in technical education (i.e., Tech Prep, School to Work Transitions, etc.)?
3. Do you see Tech Prep as moving in the right direction toward students preparation for the work place?
4. Do technology classes help non college bound students prepare for the work place?
5. Should technology classes be required for all students at the high school level?